ANNUAL REPORT

OF THE

GOVERNOR OF THE PANAMA CANAL

FOR THE

FISCAL YEAR
ENDED JUNE 30
1915

SEAL OF THE CANAL ZONE ISTHMUS OF PANAMA

WASHINGTON
GOVERNMENT PRINTING OFFICE
1915

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ANNUAL REPORT
OF THE
GOVERNOR
OF
THE PANAMA CANAL.

The Panama Canal,
Office of the Governor,
Balboa Heights, Canal Zone, August 2, 1915.

Sir: I have the honor to submit the annual report covering the construction, operation, maintenance, sanitation, and protection of The Panama Canal for the fiscal year ended June 30, 1915.

ORGANIZATION.

A number of changes were made in the organization as it existed at the close of the previous fiscal year, the principal ones resulting from the occupation of the new administration building, which permitted the consolidation of all departments and divisions of The Panama Canal and of the Panama Railroad Company under one roof. The plan outlined in the report of the executive secretary for the fiscal year of 1914 was carried out. Practically all the clerical work previously handled separately by the different departments and divisions was assigned to the executive office, and the files, records, personnel records, timekeeping and property accounting were consolidated.

With the transfer of the offices of the Panama Railroad Company from Colon on October 15, 1914, all auditing, collecting, and disbursing were combined with similar functions under officers of The Panama Canal, and the separate organizations for these purposes were discontinued.

Effective July 15, 1914, the division of erection was discontinued, and the duties, in the main, transferred to the supervision of the engineer of maintenance.

The electrical work connected with the Panama waterworks of the municipal division was transferred to the electrical division on July 15, 1914, and the telephone, telegraph, and railway signal systems were transferred from the Panama Railroad to the electrical division of The Panama Canal on April 1, 1915, together with the fire-alarm systems of the police and fire division.

On October 1, 1914, a building division was organized, charged with the construction of all buildings belonging to The Panama Canal, the Panama Railroad Company, and the Army.

The force for the operation and maintenance of the canal was organized from the construction forces as far as practicable and placed in charge of the maintenance and operation of the locks.

CONSTRUCTION.

The department of operation and maintenance continued in charge of the Governor, who was assisted in the administration of the department by the engineer of maintenance and the marine superintendent. In compliance with orders, Col. (now Brig. Gen.) H. F. Hodges, United States Army, was relieved from duty as engineer of maintenance on January 1, 1915, and Lieut. Col. Chester Harding, United States Army, was assigned to this duty. The designation "Superintendent of transportation" was changed to "Marine superintendent" as more suitably designating the duties of the position, and Capt. Hugh Rodman, United States Navy, continued on this duty.

The engineer of maintenance was in charge of the completion of the locks, the electrical and municipal divisions, meteorology and hydrography, general surveys, the office engineer, and the operation and maintenance of locks.

Locks.—The lock-operating machinery was practically completed during the preceding fiscal year; the principal exception was the installation of the chain fender machines, which was still in progress, and these machines were completed, so far as concerns the mechanical installation at Gatun on November 30, 1914, and at Pedro Miguel and Miraflores on September 4, 1914. The electrical installation was completed at these three localities on November 30, 1914, October 28, 1914, and June 25, 1915, respectively. Delay was occasioned by a change in plans by which the motors above the sump pumps were raised, thereby increasing considerably the capacity of the sumps and requiring the pumps to operate less frequently. The delivery of the chains was completed on January 6, 1915, and they are all installed.

The telephone systems on all the locks were completed in February, 1915; a description of the system adopted was given in the annual report for 1914.

Delivery of the towing locomotives under order from the General Electric Co. was completed on November 14, 1914. They have operated very successfully, and, in accordance with the specifications, at a speed of 2 miles per hour. This speed is too high for vessels of heavy tonnage, so that experiment was made to determine the effect of connecting two traction motors of each locomotive in cascade, suggested by Mr. R. H. Whitehead. This reduced the speed to 1 mile an hour and was so successful that material has been ordered to permit changing all the locomotives which will then have speeds of 1 and 2 miles per hour, the change from one to the other being accomplished by throwing a switch in the cab, within easy reach of the operator.

The back fill of all the locks was placed prior to the beginning of the fiscal year, but as it was left in very irregular shape the back fill of all the locks was graded and sloped, with the view to improving the general conditions and appearance around the locks. At Gatun the work was placed under Mr. John J. Walsh, general foreman, who was in charge of the work of leveling off, grading, and sodding the slopes of Gatun Dam. On the Pacific side the work was under the superintendent of the locks. Due to the advent of the rainy season, the work at Miraflores was not completed. The amounts expended were $32,742.32 at Gatun, $20,631.20 at Pedro Miguel, and $19,207.87 at Miraflores.

The temporary wooden structures at the various locks, which housed machinery for local repairs during construction, were unsightly and dilapidated. As such machinery is necessary at the lock sites for minor repairs in connection with the maintenance of the lock operating machinery, permanent repair shops were erected to take their places, one each at Gatun, Pedro Miguel, and Miraflores. They are reinforced concrete buildings, 110 feet long and 38 feet 6 inches wide, and contain dry rooms, open and closed storage spaces, blacksmith shop, general shop, and latrines for white and colored employees.

The floating caisson was completed and arrived at the canal on October 29, 1914, was tested at Miraflores locks, accepted, and used during the year to permit the painting of the gates of the Pacific locks.

Electrical division.—This division continued in charge of Capt. William H. Rose, United States Army. The hydroelectric station at Gatun, having been tested out, was put in service on July 13, 1914, and since then has been in continuous operation. The average production cost of current during the last six months of the fiscal year was .09 cents per kilowatt hour, and the average cost delivered from all substations was .65 cents per kilowatt hour. These costs do not include the charge for functional depreciation of 3 per cent of the capital cost of the entire power system. Including this, the costs were .44 and .99 cents per kilowatt hour, respectively.

When the hydroelectric station was put in service, the Gatun steam plant was shut down and since then has not been operated for the generation of power. The Empire steam plant, together with the compressors at this locality, was shut down permanently on September 17, 1914, and the Balboa plant on May 23, 1915. The Balboa air-compressor plant continued to operate during the year supplying air to the Balboa shops and the terminal construction work.

The construction of the Gatun substation was so far advanced that part of the equipment was placed in service in October, 1914. Both Gatun and Cristobal stations were placed in complete service on December 5, 1914, and the Balboa and Miraflores substations on December 3, 1914.

Construction work in connection with the transmission line was completed during the year, and the sections between Gatun and Cristobal, and between Miraflores and Balboa, were placed in operation on December 3. The section between Gatun and Miraflores was placed in service on January 2, 1915, by which time the overhead telephone and telegraph wires of the Panama Railroad system had been installed in the new duct lines.

When the transmission line was put in service the Miraflores steam station was operated as a reserve plant, several of the boilers being kept under pressure at all times, so as to provide prompt resumption of service in case of failure on the part of the transmission line.

A substation was constructed at Gamboa for the new pumping plant of the municipal division, the sand and gravel handling plant of the Panama Railroad Company, and for local lighting. It was placed in service during February, 1915, and contains two transformers of 666 KVA capacity each, with the necessary oil switches, lightning arresters, etc. A substation was also constructed and placed in operation in March, 1915, for the Darien High Power Naval Radio Station. It contains two 266 KVA transformers and auxiliaries. This work was paid for by the Navy Department.

A large amount of construction work was done in connection with the installation of underground conduit systems for the distribution of electric light and power, and for telephone, telegraph, and fire-alarm service in the permanent towns, for the supply of the coaling plants, dry docks, pumping station, and for the Army posts. Street lighting is being installed in the permanent towns of Ancon, Balboa, Pedro Miguel, Gatun, and Cristobal, and was carried to about 90 per cent of completion during the fiscal year. The lights are of the new gas-filled, tungsten filament type, 6.6 amperes, 150 candlepower rating, and are inclosed in 14-inch polycased globes, mounted on top of ornamental cast-iron posts. The spacing varies from 150 to 220 feet, dependent on local conditions. The mounting height is 10 feet 3 inches to the center of the globe. There are 367 lights in the Ancon-Balboa district, 22 at Pedro Miguel, 57 at Gatun, and 74 at Cristobal.

The light and power installations in the Balboa shops were completed, and the Mount Hope dry-dock shops were electrified and a

2,500-cubic-foot motor-driven air compressor installed. Two 550-kilowatt rotary converters were installed, one each at Gamboa and Balboa dock. Three installations of large motor-driven relay pumps were made for the dredging division, and the floating pump barge was equipped for service at the locks.

Work was done for the Navy Department in the electrical installation of three radio stations. In the construction of quarters and other buildings for The Panama Canal and for the Army and Navy Departments considerable work devolved upon the electrical division.

The decision concerning size and number of generating units to provide power for the canal was determined in May, 1911, and was based on studies made prior to that date of the probable power demands that would be required. The result of the studies showed a probable day load of about 4,000 kilowatts, assuming that the Panama Railroad was not electrified, but if this were done the probable day load was computed at approximately 5,000 kilowatts, with one hour's peak of 5,700 kilowatts. This assumption was also based on the fact that electric current would be generally used for domestic purposes. Under these circumstances the generating equipment installed, furnishing 6,000 kilowatts, allowed for a reserve for future growth of about 1,000 kilowatts. In August, 1912, Congress authorized the construction of coaling stations, dry docks, and machine shops, and, though estimates for the probable amount of power that would be required for these purposes were prepared and considered in determining the power plant, the completed designs show power requirements greater than the estimates. Additional demands are made upon the power by reason of the United States Navy submarines stationed in the Canal Zone; by the light and power loads at Forts Randolph, Sherman, and Grant; and by the new waterworks for the south end of the canal, designed and undertaken since the original studies. The result is that the time is not far distant when additional power will be required, and provision should be made for increasing the capacity of the existing plant and installing a reserve unit. Estimates to be submitted for the latter will include the duplication of the present power house and the installation of one additional unit. Anticipating that an extension might become necessary with time, the penstocks and tailraces were provided in the construction of the spillway during the construction period.

Municipal engineering.—The division of municipal engineering was in charge of Mr. George M. Wells, as resident engineer, until May 10, when, due to the practical completion of the Panama waterworks, he was assigned to other duties and the work of the division was transferred to Mr. D. E. Wright, as municipal engineer. The division is divided into two districts, the northern district covering that part of the Canal Zone lying north of Darien, including the city of Colon, and the southern district embracing the Canal Zone lying south of Darien, including the city of Panama.

The work on the Panama waterworks, which was undertaken during the previous fiscal year, was completed. As previously reported, the original plan contemplated the location of a pump station at Miraflores, utilizing the waters of the lake as the supply; but this had to be abandoned, due to the heavy rise in chlorine in the Miraflores Lake. This pump station, which was nearly completed when the source of supply had to be changed, was remodeled and transferred to the fortification division for use as a storehouse. A station was then built at Gamboa, and the pipe line, extending from Gamboa to Miraflores, was installed during the year. It required the laying of 59,762 linear feet of cast-iron pipe, varying in size from 24 inches to 36 inches in diameter. The trench was excavated by contract at a total cost of $22,000, and the total cost of the pipe line, including the cost of pipe, fittings, excavation, and backfill, was $356,951.10.

The construction of the Miraflores purification plant was about 45 per cent completed on June 30, 1914. The plant was completed and put in operation on March 16, 1915. It consists of the wash-water tank, the aeration basin, the head house, the sedimentation basin, the filter building and pipe gallery, the laboratory and quarters, the clear-water basin, and the injection chamber. The total cost of the plant was $558,168.41, of which $203,625.12 was for work done during the year. Walks and a roadway were constructed around the plant and the latter connected with the Canal Zone road to Panama.

The delivery of water from the purification plant at Miraflores to the pump station at Balboa is through three parallel lines, each 21,000 feet in length, the diameters being 30 inches, 20 inches, and 16 inches, respectively; this work was also completed during the fiscal year.

As part of the new waterworks, an extension was made to the existing high-service reservoir on Ancon Hill, at elevation 300, by constructing an addition having a capacity of 1,500,000 gallons. This work was practically completed at the close of the last fiscal year.

Three pump stations, one at Gamboa, one at Miraflores, and one at Balboa, were constructed, together with the necessary grading and paving and the installation of the machinery and fittings, at a total cost of $200,654.22. The total cost of the new Panama waterworks was $1,387,490.57.

In addition to the new water-supply system, work was in progress during the year on the construction of roads and walks, water and sewer systems, and the grading and sodding of grounds in the Balboa townsite. This work was under the landscape architect from

July 1 to November 1, and under the municipal division for the balance of the year. A total of 29,200 linear feet of asphaltic concrete streets was constructed at an average cost of about $1.90 per square yard. For the permanent road work in the southern end of The Panama Canal, a standard type of road was adopted, consisting of concrete curb and gutter, and a finished surface of 2½ inches of asphaltic concrete on a Telford base. The ruling width of the roads is 20 feet. There were laid also 7,600 linear feet of gravel paths with concrete block edging, having an average width of 6 feet, and 2,977 square yards of concrete pavement, having an average depth of 6 inches.

Considerable work was done in the vicinity of the administration building in the way of walks, stairways, grading, sloping, and sodding. For the construction of part of the pavement around the building it was necessary to build curtain walls on which to support a large portion of this pavement on account of the natural conditions of the hill on which the building is erected. In grading about the building 2,100 cubic yards of excavation were necessary, at a total cost of $63,000.

In the vicinity of the administration building and the Balboa townsite, there was graded a total area of 235,000 square yards, and a total area of 185,000 square yards sodded and planted in grass. In constructing the sewer system in the Balboa townsite 11,791 feet of pipe, ranging from 6 to 15 inches in diameter, were laid, and in the water system, 4,190 feet of pipe, varying from 6 to 10 inches in diameter, were laid.

The sewer outfall from the Ancon district was diverted from the Panama system and run into the Curundu River. This required the installation of 746 feet of 8-inch, 2,619 feet of 10-inch, and 1,646 feet of 12-inch pipe. In the silver town of La Boca two additional blocks were constructed, the municipal division building the roads, pavements, gutters, curbs, sewers, and laying the necessary water connections.

The municipal division constructed the piping system for the Balboa oil-handling plant, including the erection of the manifold and the installation of the pump, and the laying of a 10-inch crude-oil line, a 6-inch Diesel oil line, and a 4-inch water main, from the pumping plant to the oil berth, a distance of approximately 2,300 feet. A 12-inch suction line and a 10-inch discharge line, each 3,840 feet in length, were installed from the oil-handling plant to the storage tanks. A permanent 6-inch cast-iron water line, 1,808 linear feet in length, was laid to the fuel-oil handling plant at Balboa. From the storage tanks to Paraiso, a total distance of approximately 34,968 feet, an oil pipe line was laid, varying from 7 to 10 inches in diameter. A partial piping system was installed in Dry Dock No. 1, and the work was about 95 per cent completed at the end of the fiscal year.

In connection with the removal of the quarantine station from Culebra Island to Balboa dumps, the municipal division did the necessary grading, built the roads, curbs, and gutters and laid the necessary water and sewer systems. Similar work was done also for the health department, so far as roads, water, and sewer systems are concerned, in connection with the Corozal poor farm and the insane wards.

In the northern district a 300,000-gallon concrete reservoir was constructed at Gatun, to replace the 430,000-gallon steel tank previously in use and which was no longer safe. On the completion of the concrete reservoir, the steel tank was dismantled, which, together with the material in the tower, was turned into stock at Mount Hope.

This division also did work in connection with the oil-handling plant at Mount Hope, grading the site, laying the concrete floors, constructing the manifold and necessary drainage, and laying the pipe lines. The pipe line installed from the pumping station to the docks consisted of 5,700 feet of 10-inch and 5,700 feet of 12-inch pipe. A water-distribution system was installed at the oil-tank site, and consisted of 2,800 feet of 4-inch second-hand pipe and 3,000 feet of 6-inch second-hand pipe, with the necessary valves and other fittings.

No new construction work was undertaken in the city of Colon with the exception of the erection of a temporary wooden building for the sump pumping station and for the office of the cashier of the water service in Colon, to replace the building which was destroyed by the fire of April 30, 1915. The cost of this building was charged to the remaining balance of the $800,000 appropriation for sanitation in the cities of Colon and Panama. Additional installations in Colon, made necessary by the fire of April 30, and the cost of which was charged to the maintenance account, consisted of 4,000 feet of 4-inch galvanized-iron pipe, 11 range closets, and 33 shower baths.

A large amount of work was done in connection with the expenditure of an appropriation for barracks and quarters for the Army. At Toro Point a water-supply system was installed, consisting of the construction of a small 60-cubic-yard dam across the Arenal River, the erection of a pump station with the installation of the necessary equipment, and the building of a distribution system. The pump installed was a direct-connected motor-driven centrifugal pump, with a capacity of 500 gallons per minute, and is for fire protection, the regular water supply being obtained by gravity.

At Fort Amador the sum of $135,500 was allotted for grading, road, curb, and gutter construction, and the installation of sewer and water systems, and a considerable portion of the work was completed before the end of the fiscal year.

At Balboa Heights, in the vicinity of the Ancon quarry, the construction of the necessary roads, sewer and water systems was undertaken, for quarters for the commanding general and the staff, and the work was 89 per cent completed at the end of the year. In the latter part of June work was begun on the necessary grading, and the construction of roads and the installation of water and sewer mains for the mobile troops to be stationed at Corozal.

Meteorology and hydrography.—This division of the work continued in charge of Mr. F. D. Willson, chief hydrographer. Several changes were made during the year in the meteorological stations operated. The rainfall records at Porto Bello were discontinued September 1, 1914, and the first-class station at Culebra and the evaporation station on the Rio Grande Reservoir were closed September 12, 1914. On October 1, 1914, the Ancon station was closed and the equipment, including the seismographs, transferred to the administration building, Balboa Heights.

Tidal records were continued at Balboa and Colon. Considerable tidal data were furnished to the division of fortifications and to the Coast Artillery Corps.

Fourteen seismic disturbances were recorded during the year. Four were of comparative local origin, three of which were of sufficient intensity to be generally felt over the Canal Zone. No damage resulted from any of these shocks.

The average air temperature for the calendar year 1914 was slightly above the normal. On the Pacific coast March was the month of highest mean temperature and October the month of lowest mean temperature, while on the Atlantic coast July was the month of highest mean temperature and September the month of lowest mean temperature.

The rainfall during the year 1914 was deficient at all stations except Juan Mina, El Vigia, and Colon. The annual totals ranged from 132.70 inches at Colon to 64.48 inches at Balboa Heights.

The wind movement across the Isthmus was generally above normal. North and northwest winds prevailed. March was the month of the greatest wind movement and October the month of least. Two storms, or so-called "northers," visited the Isthmus during the dry season, 1915. The first storm began February 9 and lasted until the 11th. During this period the wind attained a maximum velocity of 39 miles per hour from the north. During 24 hours 7.94 inches of rain occurred, and a heavy rolling swell rolled in from the ocean.

The second storm began on April 3 and lasted until the 5th. Although accompanied by less rainfall, it was the most severe of any storm of record since the American occupation of the Canal Zone.

The wind attained a maximum velocity of 46 miles per hour, from the north. The rainfall for 24 hours was 5.42 inches. The previous maximum velocity of wind recorded at Colon was 40 miles per hour, from the south, on July 16, 1908.

The wind movement during the progress of the storm of February 9–11 was from a point a little east of north for a considerable period of time, whereas during the storm of April 3–5 it blew for a part of the time from a point a little west of north.

The most important hydrographic feature of the year was the consumption of water from Gatun Lake for lockages, hydroelectric power, and municipal purposes. During the dry season of 1915, about two and one-fourth times as much water was used for hydroelectric power as for lockages, but this ratio is steadily decreasing on account of the increase in the number of lockages.

The elevation of Gatun Lake on January 1, 1914, was 84.32, which represented a storage of 180.09 billion cubic feet of water. The total yield for Gatun Lake watershed for the year was 185,686 million cubic feet. The evaporation of the lake surface for the same period was 23,970 million cubic feet, which gave a net yield of 161,716 million cubic feet. Of this amount, 139,285 million cubit feet were wasted at the spillway, 5,182 million cubic feet were used for lockages and tests, 3,604 million cubic feet for hydroelectric power, 397 million cubic feet for municipal purposes, 265 million cubic feet for suction dredges, and 829 million cubic feet for leakage. On January 1, 1915, the lake was at elevation 87, which represented an increase in storage of 12,154 million cubic feet during the year, or a total of 192.24 billion cubic feet at the beginning of the dry season 1915. During the year 508 lockages were made at Gatun, and 502 at Pedro Miguel.

The total yield for Gatun Lake watershed for the dry season 1915 was 43,924 million cubic feet. The evaporation on the lake surface for the same period was 9,427.5 million cubic feet, which gave a net yield of 34,496.5 million cubic feet. Of this amount 23,263.5 million cubic feet were wasted at the spillway, 8,311.8 million cubic feet were used for hydroelectric power, 3,724.6 million cubic feet were used for lockages and tests, 182.2 million cubic feet for municipal purposes, 97 million cubic feet for suction dredges, and 174.4 million cubic feet for leakage. On May 1, 1915, the lake was at elevation 86.44, which represented a decrease in storage of 1,257 cubic feet. During the dry season 492 lockages were made at Gatun, and 491 at Pedro Miguel.

The 1915 dry season run-off was unusually large. The spillway discharge from the freshets of February 9, 10, and 11, 1915, and April 3 and 4, 1915, alone, had they been stored, would have raised the lake from 87 to 89.95. The direct rainfall on the surface of the lake practically equaled the loss by evaporation during the dry season. No large freshet occurred during the year; there was, however, an unusually well sustained run-off, well distributed as to time.

The total yield from Gatun Lake watershed for 1914, was 102 per cent of the capacity of the lake at elevation 85. The lake elevation has been maintained between elevations 84.75 and 87 by the operation of the spillway gates. In September, 1914, it was raised to 86, and in November, 1914, it was raised to 86.70. From December, 1914, to April, 1915, it was maintained at elevation about 87. Since then it has varied between elevation 87 and 85.50.

During the fiscal year there was an average constant spillway discharge of 5,300 cubic feet per second.

It has been determined that the Gatun spillway discharge per gate is higher than expected. At elevation 85, the wet season elevation, one gate dicharged 10,460 cubic feet per second, an increase of about 20 per cent over what was anticipated. Investigations with velocity current meters show that there are no currents during freshets that will interfere with the handling of ships.

Surveys.—The surveys were handled under parties operating under the direction of Mr. O. E. Malsbury, assistant engineer. The location of Canal Zone boundary monuments, triangulation points, and bench marks, were maintained, checked, and recorded. All survey work in connection with the permanent location of buildings, sewer and water lines, as well as checking up the alignment of permanent construction tracks on locks and dams, was done by this division. Various routine surveys, maps, plots, topographical layouts, etc., for other divisions, were prepared during the year.

Office engineer.—On September 21, 1914, the section under the office engineer was reorganized, centralizing the drafting forces of lock operation and maintenance, electrical, municipal engineering, terminal construction, and building divisions. The office was placed in charge of Mr. C. J. Embree as office engineer.

Lighthouses.—A special appropriation of $40,000 was made by Congress for the establishment of lights on the Pacific side at Cape Mala and Bona Island. These lights are nearing completion. An additional light will be established at Taboguilla Island, and when completed the three lights will render the navigation of the Pacific approach to the canal a simple and easy matter. This work was done under the direction of the marine superintendent.

For further detail concerning the work done by the various subdivisions under the engineer of maintenance, attention is invited to Appendix A.

DIVISION OF TERMINAL CONSTRUCTION.

The division of terminal construction, under Rear Admiral H. H. Rousseau, United States Navy, was charged with the design, inspection, and construction of dry docks, shops, coal and fuel oil plants, floating cranes, docks, and other terminal facilities, and the construction of the east breakwater at the Atlantic terminal.

Dry docks.—The general dimensions of Dry Dock No. 1 are as follows:

Width of entrance	feet	110.0
Width in body of floor	do	113.0
Width in body at coping	do	143.0
Length on center line from point of miter sill to head	do	1,044.0
Length on center line from outside of masonry at entrance, to inside of head	do	1,110.0
Elevation of top of blocking 4 feet 6 inches high referred to mean sea level		−35.0
Elevation of miter and caisson sills referred to mean sea level		−39.5
Elevation of coping referred to mean sea level		+16.5
Volume of water contained with tide at mean sea level, elevation 0.0, cubic feet		5,265,000

The dock is founded on rock, which for the most part is hard, but which contains spots, relatively small, where decomposition has occurred. The body of the dock consists essentially of two parallel gravity walls, connected by a semicircular head; the floor of the dock is merely a smooth skin, laid over the rock exposed by the excavation, the minimum thickness of which is 1 foot, increasing to 5 feet where some of the soft pockets occur. The floor is level longitudinally and for the middle 66 feet of its width, but between this level middle part and the side walls, a distance of 23.5 feet, the floor has a fall of 6 inches, making the elevation of the top of the gutter, which is formed at the base of each side wall, −40. The side walls are reinforced at their backs with 70-pound rails, spaced 4-foot centers for the lower portion of the walls, and 8-foot centers for the upper portion to within 13.5 feet of the coping level. The walls average 29.5 feet in width, and are 12 feet thick for the upper 20 feet of their height. The working faces are formed into four altars, each 3 feet wide, the height of the altars beginning at the coping, elevation 16.5, being 20 feet, 4 feet, 4 feet, 8 feet, and 20 feet, to elevation −39.5. The wall for the lower 20 feet is battered 20 on 3. To prevent hydrostatic pressure behind the walls, a drain is formed at elevation −27.5 on the back of each wall, which communicates with the dock body by four 8-inch pipes through each wall. Four stairways are provided from coping to dock floor, one at the entrance, one at the head, and two intermediate. Extending completely around the dock and connecting to tracks on the entrance pier will be a 22-foot gauge track with a 50-ton traveling crane of 87-foot reach. A row of capstans and bollards parallels each side wall at a distance of 40 feet from the coping.

The normal closure of the entrance is by a pair of steel mitering gate leaves, identical with the lock gates, except that the bearing surfaces at the miter and quoin ends are to be of Demerara Greenhart, instead of nickel steel as in the lock gates. The miter sill and hollow quoins are of granite. Outside the miter gate sill is a seat for the floating caisson purchased primarily for service at the locks. This seat is faced with granite similar to the gate sill and hollow quoins, and is reinforced by structural steel brackets embedded in the masonry.

The dock will be flooded through culverts formed one in the base of each side wall. These culverts communicate with the sea, each by twin openings 8-feet wide by 12-feet high, at elevation –24.5. On the south side the flooding water passes through the pump suction chamber, and on the north side the flooding culvert descends to the lower level after passing the gate recess. The floor of the suction chamber and of the lowest portion of the side wall culverts is at elevation –52, the descent being made on 45° slopes. The suction chamber is 22 feet clear width, 12 feet high, and about 80 feet long. It is expected to flood the dock, with tide at mean high water, in not more than 30 minutes. The flooding intakes are closed by "wagon-body" valves, operated by water at a pressure of 300 pounds per square inch, furnished by an accumulator provided with the pumping plant.

The plant for pumping out Dry Docks Nos. 1 and 2 is located at a distance of about 100 feet from the entrance wall, and consists of 4 main pumps, 2 drainage pumps, and 1 bilge pump, all located in a rectangular pump pit about 100 feet long by 35 feet wide. Immediately adjacent to the pumping plant is the permanent compressor plant, which consists of one 2,250-cubic-foot and one 5,500-cubic-foot motor-driven compressors. These are primarily for the shops, but they will also supply air for the various operations around the dry docks.

Award was made and a contract entered into for 11,500 cubic feet of dressed granite and 750 cubic feet of rough stone, the former at a cost of $1.90 per cubic foot, and the latter at $1.40 per cubic foot. After advertisement a contract was entered into for the pumping plant at a cost of $133,456. A contract was also entered into for the flooding and sluice valves and accessories for the sum of $49,100.

During the year 134,777 cubic yards of material were removed by steam shovel and by hand. Of this amount 102,425 cubic yards were for excavation, at an average cost of $1.2288 per cubic yard, and 32,352 cubic yards at an average cost of $2.3135 per cubic yard. The first concrete was placed on August 17, 1914, in the south wall, and

128,195 cubic yards of mass concrete were placed during the balance of the fiscal year, and 24,675 cubic yards of reinforced concrete; the cost of the former was $3.9744 per cubic yard, and of the latter $6.0304 per cubic yard. There remain to be placed 25,000 cubic yards of concrete.

The total amount of fixed iron placed was 312,729 pounds, and 2,251,304 pounds of reinforcing rods and rails were embedded in the masonry. The placing of granite began in May in the miter sill, and this, together with about three-quarters of the hollow quoins were in position at the close of the year. The erection of the steelwork was begun on June 12, 1915, and all of the girders of the two leaves were placed in position on June 23, 1915. At the end of the fiscal year 565.68 tons of steel had been erected at a cost of $6,391.19, or $11.2982 per ton, including the driving of 1,919 rivets. Backfill to the amount of 33,787 cubic yards was put behind the walls, at a cost of $15,430.36, or an average cost of $0.4567 per cubic yard, and work started on the foundations of the air compressor and pumping plant.

It was decided during the year not to complete Dry Dock No. 2 and the adjacent repair piers, Docks 10, 11, and 12, until the necessity for one of such dimensions becomes apparent. This dock will be rectangular in plan, with side walls and head walls of gravity section, but only the head wall and south side wall of the dock are being built; the latter wall supports one side of the entrance pier, the other being supported by concrete columns and steel framing. The entrance pier as now building is 59 feet wide by 350 feet long. It will have a reinforced concrete deck slab and will support a 22-foot gauge crane track and two standard gauge tracks. At its west or sea end there is now to be furnished an electric capstan similar to those around Dry Dock No. 1 for use in handling ships entering Dry Dock No. 1.

The entrance pier is situated on the north side of the entrance basin. Nearly all the excavation for the pier was completed in the previous year, and but 5,313 cubic yards were excavated during the present fiscal year in preparing foundations, at a cost of $3.4839 per cubic yard. There were 11,232 cubic yards of plain concrete placed at an average cost of $4.2455 per cubic yard and 602 cubic yards of reinforced concrete at an average cost of $8.5610 per cubic yard. Of the above amount of concrete, 10,189 cubic yards plain and 229 cubic yards reinforced concrete are contained in the gravity section of the pier, which will form the south wall of Dry Dock No. 2, should the need of a dry dock of such dimensions become apparent.

Shovel work in the entrance basin was continued in connection with the dry-dock excavation. Nearly all of the material was removed at the end of the fiscal year. There was very little seepage through the cofferdam, and the steam pumps which were installed had no difficulty in handling the water. The remaining excavation for the entrance basin, under and outside the cofferdam, will be done in the wet after the completion of the dry-dock gates and the installation of the valves, when water can be put behind the cofferdam. The amount of material excavated during the year in the entrance basin by steam shovel was 8,771 cubic yards at an average cost of $1.0704 per cubic yard.

Balboa coaling station.—The concrete work in connection with the crane tracks and the docks for the station was continued throughout the year. The supports for the berm crane tracks consist for the most part of steel girders arranged in pairs, supported on concrete piers spaced 25-foot centers. The piers supporting one of the tracks also support the conveying system viaduct which parallels the berm crane travel by means of piers of buttress form extending above the main pier. These buttress piers also support reinforced concrete curtain walls which confine the coal in the subaqueous storage, a length of about 300 feet, and also for a distance of about 200 feet to the west of the subaqueous storage where deep foundations were necessary. For the balance of the unloader travel the total length of which is about 800 feet, the rails are supported on continuous concrete walls founded on rock or rock fill.

The unloader wharf (Dock No. 7) will be 1,052 feet in length by 59.5 feet in width. The type adopted in August, 1914, consisted of concrete piers, spaced 25-foot centers, anchored to the rock, extending the full width of the floor of the dock and having a width of 8 feet at the bottom, which is offset to give a width of 6 feet for the upper portion of each pier. These piers carry longitudinal steel girders which support the tracks, the reinforced-concrete deck slab, and the necessary superstructure of the coaling plant. The unloader wharf supports two coal unloading towers, having a travel of 790 feet. At the end of the fiscal year the wharf had been completed to the cofferdam. Eighteen thousand three hundred and thirty-one cubic yards of concrete were placed in the unloader wharf, at a cost of $5.4746 per cubic yard.

A general layout for the reloader wharf (Dock No. 6) to be 745 feet in length by 64.2 feet in width was approved in August, 1914. For the substructure 6-foot cylinders with steel forms sunk to rock were adopted, except under the wharf bunker, where 8-foot cylinders will be placed on account of the heavy loads. The deck will consist of steel longitudinal and cross girders, with a reinforced concrete slab. In January, 1915, the construction of a trestle was begun and thirteen 6-foot caissons were set in place. After the work had started the bank started a slow movement toward the canal, and in order to remove the sliding material the bank was sluiced down, first by a hydraulic monitor and later on to better advantage by a monitor installed on the discharge end of a suction dredge. After the movement stopped, the work of caisson sinking proceeded. At the end of the fiscal year all but 3 of the caissons were in position, 27 had reached rock, and 46 were in the process of sinking. A total of 4,246 feet of caissons were sunk during the year.

There were excavated 17 cubic yards of rock and 4,685 cubic yards of earth in the coal pockets. Riprap retaining walls were constructed around the underwater storage area and around a part of the two dry storage areas. At a cost of $5.5669 per cubic yard, 5,393 cubic yards of concrete and 2,799 cubic yards of rubble masonry were placed in the masonry walls and crane supports. The piers supporting the runways for the berm cranes were erected, and the floors of the coal pockets were leveled off, with the exception of the south half of the east area.

The four berm cranes, originally used by the Pacific division, for handling concrete, were dismantled and brought to the site and erected on the runways provided. They were remodeled to fit the work for which they are to be used. By the close of the fiscal year 1,097.8 tons of steel had been erected in these cranes, the structural ironwork was complete, and about half of the machinery installed. The unloader towers, which were furnished by the contractor, arrived on the Isthmus in May, 1915, and at the end of the year one tower was in place and bolted up but not riveted. No deliveries of the reloading towers and conveyor system had been made at the end of the year by the contractor.

Cristobal coaling station.—During the year the dredging division completed the excavation of the subaqueous coal pockets to elevation −28. The total material dredged for the coaling station was 188,667 cubic yards, at a cost of $0.5836 per cubic yard.

Caisson foundations for the south 500 feet of the unloader wharf were completed on January 1, 1915, for the entire unloader wharf on June 4, and for the entire reloader wharf on June 15. Work on caissons for the end wharf commenced on June 5, 1915, and at the end of the fiscal year 8 out of 31 caissons were completed. These caissons are all 6-foot cylinders of one-half inch or three-eighths inch steel plate, and riveted in lengths of from 10 to 50 feet, depending on the depth of the water. Caisson driving started in July, 1914, and excavation work began soon afterward. In all 11,917 linear feet of penetration was made, 15,027 cubic yards of material were excavated, at an average cost of $2.1133 per cubic yard, and 17,953 cubic yards of concrete filler were placed in the caissons during the year, at an average cost of $4.6833 per cubic yard. Most of the caissons were sealed at the bottom while full of water. After this the water was pumped out, the top surface of the concrete was cleaned, and the filling of the cylinders proceeded as in an open form above ground. This method assured a good quality of concrete. Run-of-bank gravel was used with a mixture of 1:5 for the cylinders and 1:4 for the floor. In addition 6,577 cubic yards of concrete were placed in the wharf floors, 3,873 cubic yards in the bridge track retaining walls, and 316 cubic yards in miscellaneous foundations during the fiscal year, at an average cost of $4.5043 per cubic yard.

The steel deck was erected by contract, and at the end of the year that for the unloader wharf was erected and riveted, and that for the reloader wharf was 98 per cent completed. No deck steel was erected for the end wharf. The south 520 feet of the reinforced concrete floor of both unloader and reloader wharves was completed at the end of the year; thus 1,040 linear feet of wharf structure was entirely completed, except for the installation of the wooden fender system and cast-iron snubbing posts. The concrete retaining walls south of the coaling pier, which carry the stocking and reclaiming bridges, were completed, except for concreting in the permanent tracks. The foundations for the transformer house and for the viaduct trestle south of the wharves were completed. About 90 per cent of all permanent railroad tracks south of the wharves are in their permanent position and require only a small amount of ballasting. The east shore of the coaling station was riprapped with hard rock from Sosa Hill.

The erection of the two 315-foot stocking and reclaiming bridges which span the coal-storage area, was commenced by the subcontractor, in November, 1914, and at the end of the fiscal year both bridges were completed, except for the installation of the propelling machinery. All viaduct trestle south of the wharves and 500 feet of trestle on the south end of the reloader wharf were completed, except for the installation of crossties and rails. The transformer house was about 75 per cent completed. Foundations for the track scales were completed by the Panama Canal forces.

The erection of the structural steel for the four unloader towers at the south end of the unloader wharf was begun by the contractor on March 3, 1915, and progressed satisfactorily. The two north towers were completely erected and riveted, and in tower No. 1, 85 per cent of the machinery was installed, while in tower No. 2 about 40 per cent of the machinery was installed. Of the two south towers, No. 3 was completely erected and 85 per cent riveted, while tower No. 4 was completely erected and partly riveted at the end of the fiscal year.

A number of additional applications were received during the year from coal companies for storage space but no assignments had been made at the end of the year.

Balboa shops.—Construction work on the Balboa shop buildings was nearly completed at the end of the last fiscal year, the main item of work remaining to be done being the closing in of the sides of the buildings. Changes, added requirements, and necessary delays in construction, extended the period of completion until June 15, when the shops were formally turned over to the mechanical division and the storehouse to the supply department. The plaster on metal-lath closures, which required the placing of 6,077 square yards of plaster, was completed in February, 1915. Some changes in the location of machines in buildings Nos. 1, 2, 4, and 8, were also made, and the last machine foundation was poured in January, 1915. The total amount of concrete poured for machine foundations from July, 1914, to January, 1915, was 374 cubic yards. In January the columns of building No. 8 were lined up, and corrugated iron siding was placed in lieu of plaster and in lieu of the 42-inch concrete wall around the building. Construction work for the installation of the exhaust system in building No. 8 was begun in February. In March the potash vat building was erected and the concrete floor poured. The maintenance of the cement tile roofing was expensive on account of the large amount of work done in connection with the closures of the buildings, and the consequent travel over the tile roofs by workmen, and also on account of the breakage of tiles by rocks from blasting in the neighboring dry dock and Sosa Hill excavation. Steel rolling doors were placed as closures in the ends and sides of the main buildings, while the main buildings have sides and a portion of the ends closed with movable metal louvers.

East breakwater.—As noted in the last annual report, it was decided to build a detached breakwater on the east side of Colon Harbor to protect the inner harbor from waves caused by trade winds, its general direction extending on a line from Coco Solo to a point 2,000 feet east of the outer extremity of the west breakwater. As therein noted, it was decided to obtain the rock from the Sosa Hill quarry and transport it across the Isthmus.

There was much discussion for several years about the necessity of the east breakwater on account of the disastrous effects of "northers" on the channel through Limon Bay. During the past fiscal year two severe "northers" were experienced, the first one on February 9, when the direction of the wind was north and slightly east, and the other on April 3-5, of three days' duration, when the direction of the wind was about north and slightly west, but much more severe. Notwithstanding them, the surveys made subsequent to the "northers" showed that they had not affected the depths in the channel through the bay, demonstrating that so far as the protection of the channel is concerned, the east breakwater is not a necessity. The breakwater, however, was undertaken at the request of the Navy Department, as stated in a previous annual report.

From July 1, 1914, to February 8, 1915, the double-track trestle was advanced 6,048 linear feet, and also about 400 feet of single-track trestle were driven, thus making the entire trestle double track for a total length of 9,498 linear feet.

The filling of the trestle was started on September 16, 1914, for which purpose excavation in Sosa Hill was begun on the same date, and a total of 363,658 cubic yards were excavated for use at the east breakwater, at a cost of $0.5750 per cubic yard. Of this amount 321,146 cubic yards were actually placed in the east breakwater, at a total cost of $1.0170 per cubic yard, the remainder having been diverted for other purposes. This fill was distributed between stations 0 and 35 plus 75. For the greater part of this distance the fill was carried up to or a little above sea level on the sea side of the trestle, and to within 10 feet of the surface on the harbor side.

There is a large quantity of good coral sand in the vicinity of Coco Solo, and use was made of this for the interior fill between the rock piles dumped on either side of the trestle; the sand was excavated and deposited by means of a suction dredge and formed part of the core of the breakwater. In connection with this fill a relay station was constructed on the trestle, and 19,556 cubic yards of Sosa Hill rock were deposited at the station to protect it from storms. The work was continued until February 9, 1915, when the "norther" of that date suspended all operations.

The fill by the suction dredge was commenced on September 22, 1914, and there were placed 252,319 cubic yards, at a cost of $0.6073 per cubic yard. In addition, material was dumped from scows obtained from excavation in progress in Cristobal Bay and by the dredge *Caribbean*, aggregating 1,498,152 cubic yards of material, of which 253,566 cubic yards were hard material. Of the above quantities, 81,142 cubic yards of hydraulic fill, and 357,874 cubic yards of dredged material, of which 127,243 cubic yards were hard material, have been placed on the axis of the trestle since February 9.

The "norther" carried away the trestle from station 17 plus 97 to station 59 plus 26, measured from the shore, and on the fill from station 21 to station 38 plus 05, a total distance of 5,834 linear feet. The relay station was partially wrecked. Two pile drivers were lost with the trestle in the "norther" of February 9, and one was salvaged with the aid of the *Hercules*, but only the car body and trucks of the other driver were recovered. In addition to the pile drivers, there were lost 23 lidgerwood cars, 1 unloader, 1 plow, a box car, and 2 push cars.

Work was immediately started in salvaging the trestle material and redriving a single-track trestle, and a considerable amount of material from the trestle was salvaged, but on April 3-5, 1915, another severe "norther" visited Limon Bay, doing further damage to that part of the trestle which remained standing after the one of February 9. Practically all of the trestle that had been driven was destroyed by the two storms.

The effect of the "northers" on the fill that had been placed was to level it off very uniformly to a depth of from 10 to 14 feet below sea level, and to make a broad platform, in some cases 120 feet wide, with flat slopes on which to dump the armor rock. The difference between the volumes calculated from cross sections taken before and after the "northers" was 62,221 cubic yards, or about 13 per cent, which represents the amount of material carried away or lost by the action of the storms.

The net effect of the two "northers" will be to increase the cost of the east breakwater about $370,000. The storm of April damaged the west breakwater, and $100,000 will be required for its repair.

Work on the reconstruction of the trestle was begun on April 12, 1915, since which time 4,558 linear feet of single-track trestle, and 159 linear feet of double-track trestle, were driven; 22,760 linear feet of creosoted piling (second hand); 18,642 linear feet of untreated piling (second hand); and 57,130 linear feet of untreated piling (new) were driven. Four thousand eight hundred and seventy-six linear feet of track, and 3,092 linear feet of 3-inch water pipe were laid, but no rock was excavated for the breakwater subsequent to February 9.

Fuel-oil handling plants.—These plants, one at each terminal of the canal, are designed to handle oil from the tanks located at Mount Hope and Balboa to three ships simultaneously at each locality at the rate of 1,200 barrels per hour per vessel; and also deliver oil by pipe lines at the rate of 400 barrels per hour from Mount Hope to Gatun and from Balboa to Paraiso.

Construction work was commenced on the Pacific terminal plant in July, 1914, and was completed sufficiently to be turned over for operation on January 12, 1915. At the Atlantic terminal, construction work commenced in August, 1914, and the plant was placed in commission on February 28, 1915.

At the Atlantic side, Dock No. 13 was connected with the oil handling plant by one 10-inch and one 12-inch pipe line, and provision made for the addition of a third line should future demands require it. The two lines now in service at Dock 13 are being extended to the coaling pier, No. 16, by 10-inch lines laid under the French canal. Across the French canal the lines will be reduced to pipes 8 inches in diameter, and laid along both sides of the coaling plant, with six 8-inch outlets on the unloader wharf, 6 on the reloader wharf, and 2 on the end wharf, making a total of 14 outlets at the coaling pier.

At the Pacific terminal a berth for oil vessels 75 feet wide by a about 2,000 feet long, immediately adjoining the canal channel south of the old French pier, was dredged to −45, and the necessary dolphins placed. The plans call for three oil cribs, one of which, "C," consisting of a steel and concrete dock 62 feet square, supported on nine 6-foot cylinders driven to bedrock, was completed and placed in service.

Lots for the erection of tanks by individuals and companies are being leased under revocable licenses. All material, labor, or work of any nature required in connection with the installation of tanks by private parties are supplied by and at the expense of the licensees. At the end of the fiscal year 13 licenses were issued to five companies on the Atlantic side and 12 licenses to four companies on the Pacific side. Fourteen tanks are now in the course of construction by licensees, seven on the Atlantic side, with a total capacity of 385,000 barrels, and seven on the Pacific side with a total capacity of 285,000 barrels.

Since the beginning of operations, the oil-handling plants have met satisfactorily not only all requirements outlined in the original proposals, but have demonstrated their ability to handle oils, either way, between vessels and storage tanks, at the rate of from 1,800 to 2,000 barrels per hour.

Floating cranes.—The contract with the Deutschmachinenfabrik A. G. of Germany, for the two 250-ton floating cranes *Ajax* and *Hercules* is still in force. At the beginning of the year all material for the construction of these cranes had been manufactured at the works of the contractor, and shipped to the Isthmus; the *Ajax* left Emden on April 26, 1914, and the *Hercules* followed on May 30, 1914, arriving at the Isthmus on July 8 and 13, respectively. On leaving, these cranes were complete as regards pontoons and crane towers, but no part of the jibs were erected. The jibs and the rest of the material, including spare parts, left Antwerp about the same time. The contract permitted the use of a canal lock for erecting the jibs, and the east center lock at Gatun was assigned for the purpose. The *Ajax* was placed in the lock chamber on October 2, 1914, and on November 4 the *Hercules* followed, and the erection of the jibs commenced. When the jib had been fabricated on the wall of the lock chamber, the crane to which the jib was to be attached was brought into the lock chamber and the water lowered until the pivot jaws of the crane superstructure was level with the pivot holes of the jib. The jib was then skidded forward and the pivot pins were inserted, and after the jib was thus pivoted it was raised into place by its own luffing mechanism. The jibs were attached to the *Ajax* on October 16 and to the *Hercules* on November 8, 1914.

On November 14, the spindle carriage counterweights were placed on the *Ajax* and it was ready for service. The *Ajax* was taken to Gaillard Cut, under the direction of the mechanical division, and, manned by a crew of the contractor's employees, removed two portions of a sunken drill barge which was blocking the channel, and after successfully removing these obstructions and performing some other minor work, the crane was returned to the contractor, at Dock 14, Cristobal, on November 25, 1914.

The contractor offered the crane *Ajax* for test on December 1, 1914, and the main hoist test was assembled so that the actual tests could begin on December 3. The test with the 100 long-ton normal load was completed successfully, and the speed of the hoisting, luffing, and slewing operations met contract requirements. On December 7 the test load was increased 20 per cent, as specified by the contract, for the overload tests. The 120-ton load was hoisted clear of the wharf and luffed slowly out to the 100-ton reach of 81.6 feet from the face of the fender. No sign of distress was noticed in any member. The auxiliary hoist trolley was at the inner limit of travel, when it should have been at the tip of the jib. The instant that the controller was placed in the luffing position and the brake solenoids were heard as they released the brakes on the drums, two movements were observed: First the collapse of the back of the jib and fall of the load, which was only a short distance above the ground; a pause, and then the fall of the jib and the recoil of the pontoon. The jib pivot remained intact, and the jib in its fall turned about this pivot. The head of the jib with the sheaves which support the main load swung clear of the test load and buried itself about 6 feet in the ground. The extension of the jib beyond the point which serves as an attachment for the crab trolley sheaves struck the test load and was completely wrecked. The portal which ties the upper chord together at its second point and supports the main hoist remained in place. The connecting links from the jib to crosshead were badly twisted. The back spindle carriage track was sprung outward, and with it the two spindles. The spindles, however, were found to have suffered no injury. The upper chord was sprung and the lower chord twisted. The main hoist blocks and the equalizer bar received injury, more especially the latter, but the block sheaves were intact. One main-block triangle was badly bent. Of the upper sheaves at the head of the jib, only 2 of the 10 were broken. The crab track was badly twisted and bent. The jaws of the revolving superstructure which form the jib pivot were twisted, and the outer cover plate was ripped. The inner part of the crab track penetrated the operator's cab and injured the controllers and instruments. The hoisting rope was kinked in places and rendered unfit for use. No one was injured.

Investigation of the accident led to the conclusion that the heel strut was the first to fail and that the failure was due probably, not to insufficient sectional area to resist the maximum direct compression, but to the distribution of metal in this member, to the insufficient strength of latticing and tie-plates, and to the rivets connecting these details to the main members, as well as failure to provide adequately for flexure as well as direct compression. The contractor did not concur in the above-stated causes of failure, and while stating he did not know the exact cause of the accident, expressed such confidence in his design that on December 10 he offered the *Hercules* for contract tests. The Panama Canal was unwilling to permit this to be done without the reinforcement of certain members of the jib. This work on the *Hercules* was begun on January 11, and three members of each truss of the jib were strengthened, and on January 27 the *Hercules* was again offered for test. The tests of the *Hercules* were completed satisfactorily on March 27, 1915, and on March 30 the crane was accepted by The Panama Canal with a few minor exceptions, and turned over to the mechanical division for operation. A new jib for the *Ajax* was completed at the works of the contractor on April 15, and on June 10, 1915, the structural steel for the jib arrived on the Isthmus; the erection was started, and about 25 per cent erected at the end of the year.

Colliers.—Work continued on the two Panama Canal colliers *Achilles* and *Ulysses,* for which contract was awarded to the Maryland Steel Co. on April 9, 1914. They were constructed under the supervision of the Bureau of Construction and Repair of the Navy Department; they were completed, met the contract requirement as to speed, and the *Ulysses* arrived at the Isthmus on its first trip with 12,000 tons of coal on April 27, 1915, and the *Achilles* arrived on June 17, 1915. Until the permanent coaling plant is completed, the colliers will be unloaded by the Brown hoist at the dry-dock entrance slip. The colliers are operated by the Panama Railroad Company.

Tugs.—The two tugs, built under contract with the Staten Island Shipbuilding Co., dated May 8, 1914, and named, respectively, the *Gorgona* and *Tavernilla*, were completed. On their trial trips in New York the *Tavernilla* developed a speed of 12 knots and the *Gorgona* 13 knots. The *Tavernilla* arrived at the Isthmus on March 21 and the *Gorgona* on April 27, 1915. Some necessary changes were made to adapt them to local conditions, and the *Tavernilla* was accepted on April 27 and the *Gorgona* on May 28, 1915. The tugs are very powerful, the *Gorgona* developing 1,283 horsepower and the *Tavernilla* 1,170 horsepower on their trial trips. They have been turned over temporarily for use by the dredging division.

Commercial and repair wharves.—The reinforced-concrete wharves referred to in last year's annual report as quay walls D–E–F, G–H–I, I–J–M–N, and Pier No. 1 have been renumbered, respectively, as follows: Docks Nos. 13 and 14, 15 and 16, 17 and 19, and Pier 18. These wharves were described in the last annual report, and the following work was done on same during the fiscal year:

Dock 13. Great difficulty was encountered in sinking the steel cylinders, due to numerous tracks leading across the site. At the end of the year 37 out of 39 caissons were sunk to rock, and two-thirds of the steelwork was erected; the steel was furnished by the United States Steel Products Co. and erected by the terminal division.

Dock 14. At the end of the last fiscal year 23 caissons had been sunk to rock, in which there had been placed 1,487 cubic yards of concrete. During the current year 2,917 linear feet of caissons were sunk and filled with concrete, completing the substructure. The steelwork for the superstructure was furnished by the United States Steel Products Co. and erected by the terminal division. The dock was completed at the end of the year, including snubbing posts and brick pavement. Filling behind the dock was completed for about two-thirds its length. Reinforced-concrete anchors were embedded behind the dock and connected directly with the girders of the dock floor by means of 3½-inch diameter steel rods tightened by turnbuckles while the rods were heated.

Docks 15 and 16. These docks were practically completed last year. The only remaining work done consisted of a small amount of brick paving, driving a few fender piles, and completing the back fill to bring the surface up level with that of the shop yards.

Docks 17 and 19. The substructure and superstructure of these docks were completed last year. The brick floor and anchors were placed during this year. At each wharf there will be a small boat landing, consisting of a reinforced concrete pontoon and steel landing bridges.

Pier 18. Nearly all of the reinforced concrete superstructure of this 1,000-foot pier was completed last year, and little remained to be done other than placing the brick pavement, the 2.5-inch anchor tie-rods, and making the fill which runs through the middle of the pier. When excavation to elevation −45 began along the south face of the pier in Slip No. 1, the pressure of the fill in the center of the pier on the very soft underlying mud caused an outward movement of the floor throughout its length before the bank could be sluiced down. Most of this movement took place on the outer half of the pier and reached a maximum of 5.5 inches for both sides. Excavation was discontinued in the slip and a portion of the fill in the middle of the pier was removed by steam shovel. The tie-rods were supplemented by a double set of 3½-inch diameter steel rods. The outward movement of the pier was stopped before any damage was caused. It is proposed to support the floor in the center of the pier on coral rock fill.

Excavation along Docks Nos. 14, 15, 16, 17 and Pier 18 was done by the dredging division. Slip No. 1 was open for commercial use the greater part of the year, and Slip No. 2 was excavated about two-thirds of its length.

Quarantine boat landing.—The boat landing for the Balboa quarantine station was designed by this division. This landing is 568 feet long and 10 feet wide and consists of a reinforced concrete walk over I-beams incased in concrete, supported on reinforced concrete pipe piles. On March 22, 1915, a contract was entered into with Mr. Alex. P. Crary for the construction of this landing, and at the end of the fiscal year all the pipe piles and the shore buttresses were in place and work was started on the bracing system and on the forms for the superstructure.

This division also had supervision of the construction of Pier 7, which is being built by the Panama Railroad Company at Cristobal.

For further particulars, see Appendix B.

DREDGING.

The dredging division continued in charge of Mr. W. G. Comber, resident engineer, and was divided into two districts, the first extending from deep water in the Pacific to Gamboa and the second from Gamboa to deep water in the Atlantic.

The following are the principal items of floating equipment engaged in dredging operations during the year:

Seagoing dredges *Culebra* and *Caribbean;* pipe-line dredges *Nos. 4, 82, 83, 84, 85,* and *86;* 15-yard dipper dredges *Gamboa* and *Paraiso;* 5-yard dipper dredges *Cardenas, Chagres,* and *Mindi;* seagoing ladder dredge *Corozal;* French ladder dredges *Nos. 1* and *5, Badger, Gopher,* and *Marmot;* drill barge *Teredo* until July 20, 1914, and from November 27 the *Teredo 2;* rock crusher *Vulcan;* and from August 24 an hydraulic grader.

Tugs *De Lesseps, Gatun, Bohio, Empire, La Boca, Miraflores, Reliance, Bolivar,* and the *Cocle* and *Mariner* until May 22 and 28, respectively, when these two tugs were replaced by the *Tavernilla* and *Gorgona;* also the tenders *Chame* and *Sanidad.*

The fleet of barges consisted of 6 of 1,000-cubic yards, 9 of 350-cubic yards, 2 of 1,200-ton, 9 of 500-ton, 3 of 400-ton, 3 of 300-ton, 2 of 250-ton, 3 of 50-ton, and 9 of 30-ton capacity, and 5 clapets. In addition there were 1 wrecking barge, 2 diving barges, 2 coal hoists, 2 oil barges, 1 water barge, 1 floating machine shop, 1 coal barge, and 2 pile drivers.

In view of the slide at Culebra and the anticipated movement on the west side of the cut at the same locality, and because the dredges

Cardenas, *Chagres*, and *Mindi* are not efficient and economical for such service, it was deemed advisable to purchase an additional high-power dredge, and as the *Gamboa* and *Paraiso* were giving such satisfactory results, a dredge of the same type, modified as experience indicated necessary and desirable, was contracted for under date of January 15, 1915, at a cost price of $376,180. This necessitated the purchase of three additional 1,000-yard barges, for the construction of which advertisement was issued; a contract was entered into under date of February 17, 1915, for their purchase at a cost of $62,600 each.

All dredging that was done in any part of the canal necessary to complete the channel to its full width and depth was charged against construction funds, and all dredging done in portions of the canal where the full width and depth had been secured at the time the canal was opened to the use of commerce, became a proper charge against, and was paid for from maintenance funds.

In the first district, between deep water in Panama Bay and the Pacific entrance, there were excavated a total of 542,012 cubic yards, of which 498,400 cubic yards were charged to construction work and 43,612 cubic yards were charged to maintenance. In Miraflores Lake 49,492 cubic yards were removed, of which 40,830 cubic yards were charged to construction and 8,662 cubic yards were charged to maintenance. A total of 6,671,183 cubic yards was removed from Gaillard Cut, of which 1,960,617 cubic yards were charged to construction and 4,710,566 cubic yards were charged to maintenance. Of the 591,504 cubic yards removed from Pedro Miguel locks to the sea, 227,529 cubic yards were rock and the balance of earth, and of the 6,671,183 cubic yards removed from Gaillard Cut, 5,559,387 cubic yards were rock and the balance of earth. The cost of removing the material from Cucaracha slide and other parts of the Cut, necessary to secure the full width and depth of the channel, were charged to construction.

The drill barge *Teredo*, while operating in Cucaracha slide, was blown up and sunk in the channel on July 20, 1914. The drills and machines removed from the wreck were remounted on a remodeled sand barge at the Paraiso shops and a new drilling outfit constructed, named *Teredo 2*. This drill barge went into commission on November 27, 1914, and operated at Cucaracha and Culebra slides and in the channel to the Pacific entrance. Of the total amount of rock removed in the first district which required blasting, 719 cubic yards were drilled and blasted by the drill barge *Teredo*, 42,913 cubic yards by the drill barge *Teredo 2*, 4,880 cubic yards by tripod drills, and 52,731 cubic yards were broken by the rock crusher *Vulcan*. The remainder of the rock removed by the dredges had been drilled and blasted in the dry by well drills during preceding years, and includes material which could be handled by the dredges without mining. During the year 294,106 pounds of dynamite were used in the first district by this division.

The operations in the vicinity of Cucaracha slide warranted the opening of the canal to commerce on August 15, 1914. Work at the slide had progressed so as to secure nearly the full width of the prism, when on the night of October 14, 1914, a break occurred at East Culebra which completely closed the channel. The entire east bank for a distance of about 2,100 feet, extending back for a distance of about 1,000 feet from the center line of the canal, settled vertically, and the lower strata squeezed into the Cut so that at some points there were only 9 inches of water where prior to the movement there were 45 feet. The canal was closed from October 14 to October 20, when a channel was dredged to sufficient capacity for the passage of shipping; but the movement continued, and the canal was again closed from October 31 to November 4, 1914, and from March 4 to March 10, 1915. The work was delayed because of the daily necessity of clearing up a channel to pass shipping.

As noted in the annual report for 1914, dry excavation was continued on the upper banks on both the east and west side of the Cut in the vicinity of Culebra, as cracks had developed on some of the benches during the preceding dry season. The shovels were withdrawn after the last vestige of cracks on the benches had been removed, and it was anticipated that no further difficulty would be experienced. An examination of the west bank made subsequent to the break of October 14, 1914, developed the existence of cracks on both banks, and the question of resuming steam-shovel operations on both banks was considered seriously, but abandoned because the amount of work that could be accomplished by the shovels would be relatively small and the cost excessive. The breaking up of the banks has proceeded so rapidly that this conclusion has been fully justified.

Cucaracha slide was very active from July to October, 1914, quiet during the dry season, and active again with the beginning of the rainy season in April. On the west side at Culebra the slide showed little activity through the greater part of the year, but in June, 1915, the general movement of the bank from stations 1771 to 1796 was noticeable, and it was estimated that 5,000,000 cubic yards of material were in motion on June 30, 1915, on the west side, the estimates being based on a uniform slope to the canal prism from the farthest crack. It is estimated that about 4,000,000 cubic yards will have to be removed from the east side.

Surveys of the canal in the vicinity of the active slides were made daily and the channel dragged and marked prior to the passage of shipping. At times the channel shoaled so rapidly that it was necessary to drag after the passage of each ship, and in some instances such shoals required dredging before the following ships could proceed.

In the second district the dredges were engaged in deepening and maintaining the canal channel at the Atlantic entrance. A total of 1,245,815 cubic yards were removed, of which 12,514 cubic yards were for construction and 1,233,301 cubic yards were for maintenance. The material excavated in this district was dumped at Mindi Island, Cristobal Mole, the east breakwater, and at sea.

A large amount of miscellaneous dredging was done during the year. For the Pacific terminals 2,718,406 cubic yards of earth and 93,686 cubic yards of rock were removed from the Balboa inner harbor by pipe-line and ladder dredges. The material removed by pipe-line dredges was used for reclaiming swamp areas north of Balboa and in the San Miguel section of Panama City; that removed by ladder dredges was towed to sea and dumped. At the Atlantic terminal 709,240 cubic yards of earth and 50,006 cubic yards of rock were removed from the Cristobal approach pier channel, and considerable dredging done in the vicinity of Piers 11, 13, and 14, Cristobal Harbor, as well as at the turning basin at the entrance of the old coal slip in order to make a channel for the new colliers. At the Cristobal coaling station 132,867 cubic yards of coral rock were removed from the area of the submerged storage basin, 2,129 cubic yards of coral rock from the east berth, 35,711 cubic yards of coral rock from the west berth, and 132,167 cubic yards of coral rock from the berth and turning basin north of the Cristobal coaling station. The dredges also furnished fills on fortification reserves at Toro Point and Margarita Island, aggregating 885,622 cubic yards; for the former 477,898 cubic yards, and for the latter 407,724 cubic yards. As already noted, coral sand and fingers were placed in the core of the east breakwater at Coco Solo, and the dredging division excavated 252,319 cubic yards of material for this purpose.

The dredging division also had charge of the production of sand and gravel for construction purposes taken from the Chame sand pit and the Chagres River gravel beds. A French ladder dredge operated in the Chame sand pit from July 1 to October 20, after which all sand was supplied from the Chagres River beds. From Chame 67,075 cubic yards were secured and delivered to storage piles. Ladder dredge *No. 1* and the pipe-line dredge *No. 82* were operated in the Chagres River sand and gravel service, delivering 455,686 cubic yards of material to the Gamboa handling plants. Suction dredge *No. 82* was placed in the gravel service because of the demand for sand and screened gravel, and a separation was accomplished by means of a screen of the revolving cylindrical type designed by Mr. Comber.

An hydraulic grader, similar to those in use by the Mississippi River Commission, was constructed and placed in commission on August 24, 1914, and was engaged in grading down the canal banks at various localities in Gaillard Cut, Cucaracha slide, Culebra slide, and Gold Hill. It was also used in sluicing mud from beneath Pier 18 of the coal reloader wharf at Balboa.

The Obispo diversion carried all the drainage water east of the canal and between the Continental Divide and the Chagres River. It was located near and parallel to the canal from a point about opposite Culebra to opposite Buena Vista. During the excavation through the Cut in the dry, this diversion channel was necessary in order to keep the excavated area from being flooded. Its location and elevation was such that the east bank of the canal was in danger, and there is no question that the diversion was responsible in some measure for some of the slides. To do away with this menace after water was admitted to the canal it was decided to drain the channel and the lakes formed in the valleys which the diversion channel crossed, by excavating a series of six ditches, one to each lake. The material was removed by hand, crane with clamshell bucket, and by sluicing with the hydraulic grader. A total of 21,700 cubic yards were excavated.

As noted in the previous annual report, temporary dykes were constructed on the south shore of Limon Bay, to protect the channel against silting from the scour that was taking place along the shores of the bay. Such satisfactory results were obtained that it was decided to replace the temporary dykes by three permanent rock dykes. Work was started in October, 1914, and completed in March, 1915. The rock was obtained from Gaillard Cut and 7,242 cubic yards were used on the work. The "norther" of February caused some settlement of the dykes and they had to be recrowned, but no settlement was noticeable after the storm in April.

The outfit used and the methods employed, as described in the annual report of 1914, for the destruction of water hyacinths, was continued throughout the year. Experiments were made with the plant and some valuable data obtained, which, together with further details concerning dredging operations, will be found in the report of the resident engineer, hereto attached, marked "C."

MECHANICAL DIVISION.

The mechanical division continued in charge of Mr. D. C. Nutting, United States Navy, during the fiscal year.

The establishments in operation under this division consisted of Balboa shops, including car shop and roundhouse; the Paraiso shops; the Cristobal dry dock shops; the Cristobal roundhouse; the Cristobal car shop; a car inspection force at Balboa and Mount

Hope; fuel oil pumping plants at Balboa and Mount Hope; and a small hostling establishment at Gamboa.

The general character of the work is in a state of transition from the construction conditions, under which the majority of the work was on railroad and excavating equipment, to the conditions of operation, under which the amount of railroad work will be relatively small, and repairs on floating equipment of all kinds, together with such as may come to the shops by vessels using the canal, will constitute the majority of the work.

In September, 1914, conditions in Gaillard Cut justified the belief that there would be no difficulty in maintaining a channel ample for the maximum traffic that would use the canal, in consequence of which it was anticipated that a large amount of the railroad equipment would be retired. The break which occurred in October, however, and the unsettled freight transportation conditions hinging thereon, made it necessary to keep in service more equipment than was anticipated, and retarded a change in the character of the force employed. On the other hand, the large amount of work to be done by the dredging division made it necessary to retain the Paraiso shops, and these shops, as well as the Cristobal dry dock shops, were employed almost exclusively on marine work.

The new office building at the Balboa shops was completed and occupied November 22, 1914, and permitted the consolidation of clerical, drafting, and supervisory forces, thus securing greater efficiency. The building is a three-story, steel and concrete structure, and was designed not only for the mechanical division, but also for the captain of the port, the pilots, and other officials connected with the work of entering and clearing ships.

The Balboa shops were formally turned over to the mechanical division on June 15, 1915.

The equipment was increased by the installation of a lathe capable of turning large crank shafts and turbine rotors and long tail shafts for vessels, and also by the erection of a pair of heavy rolls and the necessary punches, shears, and plate planers for working plates seven-eighths inch in thickness and heavier.

Throughout the year air for use of these shops was supplied from the old plant at Balboa, and in anticipation of discontinuing this source of power when the new electrically driven air compressors of the shops were to be completed about January 1, 1915, the repairs to the plant were reduced to a minimum. About November, 1914, however, the necessity became apparent of retaining the old plant in operation for a number of months, and that a material saving would result by the installation of a 2,500-foot steam-driven compressor to furnish all air at night, and additional air when necessary during the day; accordingly this was done.

The Cristobal dry-dock shops continued in operation during the year. The amount of work performed for the dredging division subsequent to the slide in October gradually increased to a maximum at the end of the year. As already noted, a 2,500-foot electrically driven air compressor was installed for use of these shops, and electric drive substituted for the machines in these shops. The dry dock was used to keep the floating equipment of the canal in good condition, but in addition the submarines of the first division submarine flotilla, Atlantic Fleet, United States Navy, were docked in October and November, 1914, and three of the vessels were docked again in June of this year. The United States Navy survey ship *Leonidas* was docked in May, 1915. The Panaman national steamship *Chitre* (later renamed the *San Blas*), was docked on January 21 and February 1, 1915, and the dock was used for five vessels belonging to private individuals and companies.

A year ago it was anticipated that the Paraiso shops would be closed down not later than January 1, 1915, but the occurrence of the new Culebra slide and the subsequent additional movements have necessitated keeping them in service. The equipment of the shop was intended to cover only repairs to dredging equipment which could not be performed efficiently at the dry-dock shops at Cristobal or Balboa. This equipment was increased by the addition of a set of plate rolls and a wood planer, together with a small number of other tools of minor importance.

For further details, as well as a statement showing the amount of work done during the year by the various shops, attention is invited to Appendix D.

BUILDING DIVISION.

From July 1 to October 1, 1914, the building division was continued under Mr. Frank Holmes, resident engineer, as part of the organization of the supply department, but effective on the latter date the division was separated from the supply department and placed in charge of Capt. R. E. Wood, United States Army, as constructing quartermaster, reporting to the Governor, following which the resident engineer resigned on November 18, 1914. Capt. Wood resigned on May 10, 1915, and the work of the division was turned over to Mr. George M. Wells, resident engineer.

With the appropriation for the fiscal year 1915 and with the assignment of the appropriation for barracks and quarters for the Army to the Panama Canal forces for expenditure the work materially increased, and the Zone was divided for administration into four principal districts, each under a superintendent. The northern district embraces all work, both for the canal and the Army, from Frijoles north, including Toro Point and Margarita Island; the central district includes similar work in the territory between Corozal and Frijoles; the southern district embraces all work south of Corozal, including Ancon, Balboa, and vicinity; and the Fort Amador district covers the construction of post buildings for the Coast Artillery at Fort Amador and Naos Island.

At the beginning of the year there were under construction, in all degrees of completion, the administration building, the hydroelectric station, four substations, commissary warehouse, radio-stations buildings, twenty-seven 4-family and nine 2-family permanent quarters, mechanical shops office building, fire station, two commissary buildings, and a schoolhouse. All of these buildings were completed and occupied within the first half of the year, with the exception of the Balboa commissary, which was finished in May, 1915.

The new canal structures that were authorized and commenced during the year were eleven 4-family and two 2-family concrete permanent quarters, Balboa dispensary, medical storehouse, oil storage building, two fuel-oil pumping stations, two public garages, forage-storage building, public bathhouse, slaughterhouse, removal and reconstruction of the Ancon Insane Asylum at Corozal, dairy and farm buildings at Corozal, 10 type 17, 7 type 4, and 15 type 14 frame quarters at Balboa and Ancon, 1 type 17 and 1 type 10 frame quarters at Corozal, and 1 type 14 frame quarters at Mount Hope, and a number of smaller buildings and utilities.

A large number of frame quarters of different types were taken from Culebra, Empire, Gatun, and other places, transported to the Balboa-Ancon district, and reerected in either their original design or under modified plans. The total number of buildings of all types and classes taken down and reerected amounted to 55.

The first appropriation for barracks and quarters for the Army was $700,000, and the second appropriation available during the current fiscal year was $1,290,000. The first appropriation was expended in concrete barracks, quarters, and headquarters building; a wagon shed and stable of wood, all at Fort Amador; a residence for the commanding general and modifications of buildings transferred from the canal to the Army at Las Cascadas, Empire, Culebra, and Gatun.

The second appropriation will be expended in the construction of concrete barracks and quarters for the Coast Artillery at Fort Amador, three storehouses of concrete, and barracks, quarters, and other buildings of wood construction at Toro Point, Margarita Island, and Corozal, together with the modifications and alterations of canal buildings at the last locality.

Prior to October, 1914, the construction of the permanent concrete quarters and the administration building was carried on under the same methods and scheme of gang construction as similar work is handled in the United States. Each building as designed called for work by the various trades and each trade was carried under a general foreman as a separate unit, passing from house to house as the buildings under construction progressed through the different stages to completion. Many or all buildings of necessity were in course of construction at the same time, and aside from the general head of the work no individual foreman or other person was held responsible for the ultimate cost of. the building. Such an arrangement seemed in the light of experience to be open to question, so that after November it was decided to undertake the construction of future buildings on what might be termed a single unit organization for each building. Each was put in charge of a foreman who had a general and diversified experience, and while the special trades were retained they worked under this foreman and were responsible to him for the amount of work accomplished while in his building. The result, as shown by the costs under the second method compared with those under the first method, indicate that the conditions of service peculiar to the Isthmus required a change in system of some kind. Part of the apparent saving and reduction in cost is undoubtedly due to the experience gained and to the natural improvement as men became more experienced in this class of work.

Comparison of unit costs of the concrete blocks, poured concrete and reinforced concrete, leads to the conclusion that the concrete-block construction is the cheapest, providing the plastering can be accomplished at a moderate cost. On the Isthmus where the skilled labor cost for this work is very high poured concrete construction, with the walls rubbed, finished, and painted, is the cheaper.

Two hospital buildings are to be undertaken, one at Colon, which was begun in June, 1915, and the other at Ancon.

For further particulars attention is invited to Appendix G.

OPERATION AND MAINTENANCE.

At the close of the previous fiscal year Cucaracha slide was the only obstacle to the passage of ships. During July, 1914, a channel had been dredged through the obstruction 150 feet wide and of sufficient draft to pass vessels drawing not in excess of 30 feet. The dredges were excavating material faster than it was falling in, and there seemed no likelihood that any further movements at the slide could obstruct the channel. These facts were reported and authority received to make a trial of the canal by the passage of one of the Panama Railroad ships, which, if successful, would be followed by another to inaugurate the use of the canal by commerce. The ship selected for the trial was the *Cristobal,* and she made the passage through the canal with slight delays at Gatun and Pedro Miguel on August 3, 1914. This was followed by the *Ancon,* which opened the canal to commerce on August 15, 1914. During the balance of the year vessels passed daily, except from October 14 to 20, October 31 to November 4, 1914, and from March 4 to 10, 1915, during which periods the canal was closed by reason of the break in the bank which occurred at East Culebra on October 14.

Settlement occurred of Gatun Dam, particularly that portion west of the spillway over the diversion channel. As this had settled below grade, it was decided in February to raise same to full height, with allowance for future settlement, thereby giving employment to some of the employees whose services would be dispensed with on account of suspension of work on the east breakwater. A total of 67,581 cubic yards of material, rock on the outside, clay in the center, were placed; rock was procured from the borrow pit west of the dam, and clay from a borrow pit north of the dam.

The Mindi Levee, constructed to keep the discharge from the spillway having access to the canal below the Gatun Locks, was the source of trouble, due to the current of the discharge, and to the poor material on which the levee is founded and used in its construction During the year 86,199 cubic yards were dumped on the levee, the material being obtained from the west borrow pit.

The maintenance work on the locks was performed for the most part by the lock operating forces while not engaged in making lockages, and the maintenance of the channels by the dredging division, as already noted.

After accepting the floating caisson, it was used for unwatering the locks at Miraflores for the purpose of cleaning and painting the miter gates and the rising stem valves. The inspection that was made of the machinery revealed the fact that galvanic action was taking place in the salt water between metals of different kinds. Tests are being made with preservative coatings having insulating properties, and it is hoped that this action can be eliminated. The rising stem valves were coated with bitumastic enamel.

The gate valves and fixed irons of the Pacific Locks were painted. Experiments have been made with various kinds of paints, but the most satisfactory coating thus far has been bitumastic enamel, and a contract was entered into with the American Bitumastic Enamels Co. to paint all the submerged parts of the lock gates structures, and maintain them in first-class condition under a five-year guarantee.

The time of lockages was reduced and the operations of the various parts of the machinery have met all expectations. Under normal conditions, with both flights in use, the average time for locking through Gatun Locks is 55 minutes, Pedro Miguel 25 minutes, and Miraflores 45 minutes.

As the vessel approaches the locks the pilot in charge is informed by means of an arrow signal the locks that are to be used and their readiness for the approaching vessel; the locomotives are attached, generally four in number on ships less than 300 feet and eight on battleships or ships of exceptional size. The ships are handled through the locks by a lock pilot, who works in cooperation with the towing locomotive operators, and directs their movements by signals from the ship. During the lockages the ships' engines are used only to assist the locomotives in starting and stopping the ship. The various operations are under the control of the operators in the control houses, and the course of the lockages is followed by tunnel operators, who stand by to see that all parts of the machinery work properly. Tandem lockages, two ships in the same chamber at the same time, are made, but have been limited in number by the towing locomotives available. Parallel lockages are made only in emergencies, to avoid undue delays to vessels.

The lighting system on the lock walls is satisfactory, and with trained lock pilots no special difficulty is experienced during night operations and no appreciable time lost.

Several instances have occurred where vessels have had difficulty in tying up to the approach piers. At the upper entrance this difficulty has come generally from high winds, especially with ships that do not handle easily. At the lower entrances the difficulty is due principally to the discharge or on account of currents caused by the meeting of fresh and salt water when the gates are opened. To facilitate arrival of ships at the lower entrance the gates are left open as long as possible, so that the currents may die out before the arrival of the ship.

The number of lockages made at Gatun during the year was 1,216, of which 1,066 were for commercial vessels; at Pedro Miguel, 1,260 lockages were performed, of which 1,085 were for commercial vessels; and at Miraflores there were 1,236 operations, of which 1,085 were for commercial vessels.

For further particulars attention is invited to Appendix A.

Capt. Hugh Rodman, United States Navy, as marine superintendent, was charged with the entry, conduct of vessels through The Panama Canal, and clearing them after transit, together with the supervision of the port captains, board of local inspectors, the pilots, the operation of lights and beacons, and the inspection and admeasuring of vessels. The duties differ from the previous year in that the lock pilots, who conduct the ships through the locks, are now under the marine superintendent.

The captains of the ports are directly in charge of the duties of assignment of wharves, docking and berthing of vessels, furnishing of pilot service to shipping, the admeasurement of vessels before transit through the canal, and the general supervision and enforcement of canal and harbor regulations relating to shipping.

In addition, the captains of the ports have endeavored to make their offices the centers of information on all matters relating to shipping and in their offices at each end of the canal branch hydrographic offices were established.

A few minor changes were made in the aids to navigation, the principal one being the rearrangement of the beacons in the Cut in pairs, one opposite the other, at all turns and in the middle of the long reaches. The characteristics of some of the lights were also changed.

Signal stations were established at Gamboa and La Pita for the interior control of canal traffic, and at the terminal ports for reporting and recording arrivals and departures.

Mooring stations were established at Gamboa and Empire; the former is permanent, but the latter is temporary. These stations were made necessary on account of the slides, although the former will be used when necessary for mooring temporarily southbound vessels to avoid passing others northbound in the Cut. The dolphin berth at Balboa was extended and strengthened.

During the period the canal was in operation, 530 vessels, representing a net Panama Canal tonnage of 1,884,728 and cargo tonnage of 2,125,735, were passed through from north to south; and 558 vessels, representing a net Panama Canal tonnage of 1,958,307 and cargo tonnage of 2,844,057, from south to north.

The tugs and motor boats for general service were consolidated under the captains of the ports of the two terminals.

The Panama Canal act defines and sets forth the basis upon which tolls may be levied, and under the President's Proclamation of November 21, 1913, the Panama Canal rules of measurement were set forth, and rates were fixed by the presidential proclamation of November 13, 1912.

The Panama Canal rules were clear cut and were based on the principle of taxing the earning capacity of the ship. They were prepared by Dr. Emory R. Johnson, who was specially employed for the purpose. He was also expected to keep in close touch with the legislative committees, acting in an advisory capacity to them on the question of ships' measurements, so that, upon the passage of the Panama Canal act it was assumed that he was fully conversant with the intent of Congress, and he prepared the substance of the presidential proclamations referred to above. It was taken for granted that they conformed strictly to the provisions of legislation.

The tolls collected on deck cargoes was questioned by the Pacific coast interests, and the matter was referred to the Attorney General for an opinion. It developed that in some cases tolls were being assessed in excess of those required by law; it developed that in lieu of the Panama Canal measurements, the net registered tonnage of the United States must apply. Much to our chagrin and humiliation we learned that Dr. Johnson was aware of the discrepancy, notwithstanding which, he presented his rules of measurement and rates of tolls for promulgation to the shipping interests of the world. Confusion has been the order of the day in consequence. The amounts collected in excess of that authorized by law will have to be refunded, and while this will reduce the revenues received, this matter is still small in comparison with the difficulty of arriving at a clear-cut system of measurement applicable to all cases that arise on the canal, when the net registered tonnage is dependent not only upon law but upon rulings and decisions of the Commissioner of Navigation, whose dictum in any particular case is final. These rules, findings, and laws are made with a view to reduce the discrepancies in harbor dues, etc., for the United States. They are made applicable to The Panama Canal when they should not be. Their application on the Isthmus has resulted in discrimination as between ships, causing friction and bitterness, and instances have arisen where the application discriminates in favor of foreign ships as against American ships. This matter is discussed at greater length in Capt. Rodman's report, hereto attached, marked "E," and the matter will be made the subject of a separate report, with the hope that legislation may be secured which will bring about laws and regulations governing measurements for the canal which will eliminate the discrimination that now exists.

The annual report of the board of admeasurers and that for the board of local inspectors is appended hereto, marked "E-1" and "E-2," respectively.

For further particulars concerning the operation and maintenance of the canal, attention is invited to Appendices A and E.

SUPPLY DEPARTMENT.

The supply department has charge of the storage and distribution of material and supplies for the use of The Panama Canal and its employees; and for other departments of the United States on the Isthmus and their employees; for vessels of the United States, and for other vessels when desired by them. It operates commissaries, hotels, and messes; has charge of the maintenance of buildings and the assignment of quarters and care of grounds. It recruits and distributes unskilled labor and is in charge of all animal transportation. The department was under Capt. R. E. Wood, United States Army, until October 1, 1914, when Maj. W. R. Grove, United States Army, succeeded him.

With the creation of the building division, repairs to buildings in excess of $50 were transferred from the supply department to the building division.

The medical storehouse was retransferred to the health department on July 1, 1914, together with its personnel, as it developed that it could be operated at less expense by the latter department.

With the depopulation of the Canal Zone and the acquisition of privately owned lands, certain plantations were secured by purchase, and as it seemed desirable to continue the cultivation of these farms for the production of cocoa, bananas, oranges, and pineapples, a horticulturist was employed and this work assigned to the supply department in December, 1914.

Due to the continuance of construction work on the terminals of the canal and the dredging operations in Gaillard Cut, there was only a slight decrease in the force at work on June 30, 1915, as compared with the previous year, the exact figures being 26,897 for this fiscal year as compared with 29,673 for the previous year. The largest force working at any time was in July, 1914, when the total was 32,437.

The labor conditions were favorable throughout the year, and common labor was particularly in excess of the demand. An effort was made to repatriate the unemployed, but without much success; the total number furnished transportation for this purpose was 6,773.

Quarters.—The settlements on the west side of the canal were abandoned, so far as their use by canal employees was concerned, at the end of the calendar year 1914. The offices, together with the personnel, at Empire and Culebra were removed to the new administration building, Balboa Heights, on September 1, 1914. The town of Empire was abandoned and taken over by the Army on November 25, 1914, and the buildings at Culebra were made available for use by the Army and occupied on March 25, 1915. The concentration of offices at Balboa Heights made the quarters question acute, and on June 30, 1915, there were 274 applications for family quarters. The total number of men, women, and children occupying Panama Canal quarters at the end of the fiscal year was 15,074. The abandonment of the Corozal settlement to make way for the Army is causing a hardship on canal employees, and although 120 additional apartments were authorized for the Ancon-Balboa district, this will not be sufficient to supply all of the gold force with married quarters. It was anticipated that with the quarters authorized there would be ample accommodations; with the completion of the construction work at the terminals the quarters occupied by part of this force will be released, but it is not believed that these will be sufficient to take care of the number of employees that will be required for the operation of the various facilities. It has been found necessary to construct another cold-storage and ice manufacturing plant, and this is being undertaken by the Panama

Railroad Company and is to be located at Balboa. The amount of coal and fuel oil handled far exceeds expectations, as does the handling of transferred freight and cargo. Thus the force required at the two terminals will be probably in excess of the decrease that will result by the termination of the construction work.

There is still a congestion in silver family quarters in La Boca, where there are over 500 applications on file, and this condition obtains in other districts of the Canal Zone. Eighty apartments were authorized for silver employees at Pedro Miguel, and when these are completed it will partially relieve conditions at Paraiso and Pedro Miguel.

Under authority of Executive Order No. 2120, dated January 15, 1915, a rental was charged for all quarters, fuel, and electric current, effective March 1, 1915. A schedule of rents was adopted with the expectation of realizing a sufficient amount to pay for the necessary repairs to the existing quarters. By Executive order of May 25, 1915, the order of January 15, 1915, was suspended until July 1, 1916.

Corrals.—The demand for teams and wagon transportation throughout the year was great, with the result that all animals were worked to their full capacity. As nearly all of the animals have been on the work for a number of years, quite a large proportion became unserviceable and unfit for further use. There died or were destroyed during the year 6 horses and 40 mules. It is proposed to substitute motor trucks and wagons for animal transportation.

Material and supplies.—The policy of limiting stock so far as possible was continued, and the value of material received during the fiscal year was $8,018,418.03, as compared with $11,116,395.10 for the preceding year. Local purchases amounted to $1,360,469.71, as compared with $2,293,144.66 for the fiscal year 1914. Local purchases of coal dropped from $929,176.57 to $543,055.36, and local purchases of oil dropped from $863,206.66 to $609,760.37.

The main storehouse at Balboa, building No. 5, was completed in September, 1914, and while a considerable amount of material had already been moved into the building prior to completion, the concentration of the stock of supplies was not completed until after the building was finished. All of the active stock was transferred from Mount Hope to Balboa, and the value of material moved was approximately $1,500,000. No material was moved that was considered surplus or obsolete, and Mount Hope was made a storehouse for obsolete and surplus stock only, the value of which aggregates $1,250,000.

At 9.25 a. m. on the morning of July 5, 1914, the Mindi dynamite magazine for the storage of explosives blew up. At the time of the explosion the magazine contained 210,500 pounds of 45 per cent and 224,650 pounds of 60 per cent dynamite, and 11,600 pounds of 60 per cent Trojan powder, the total value of which was $51,957.53. The building was valued at $7,788.70, and was totally wrecked. No cause for the explosion is known.

Scrap.—Due to the poor condition of the scrap market during the year no sale of iron or steel was made, though three shipments of scrap car wheels were sent to New York in order to furnish ballast for Panama Railroad steamers. There are approximately 24,600 gross tons of classified American scrap iron and steel and 6,000 tons of scrap rail now in storage.

The contract with the Chicago House Wrecking Co., dated September 26, 1911, for all French scrap on the Isthmus, which has been the subject of controversy for several years, was finally closed in December, 1914, by The Panama Canal agreeing to turn over to that company four hundred 12-yard dump cars and 700,000 pounds of scrap copper and brass, and the Chicago House Wrecking Co. relinquished all claim to the French scrap they had collected and stored at Mount Hope.

The sales of surplus and retired equipment and material were made under the same authority as was in effect during the previous fiscal year. The principal items consisted of steam shovels, narrow-gauge locomotives, Decauville locomotives, dump cars, star drills, relay rail and narrow gauge dump cars. The total amount received aggregated $2,000,149.10.

Some locomotives, steam shovels, pile drivers, and cars, together with a miscellaneous assortment of shop machines and small tools, were turned over to the Alaskan Railway Commission.

Subsistence.—The supply department continued in charge of the operation of the Washington, Tivoli, and Aspinwall Hotels, of the line restaurants, and of the laborers' messes. The Hotel Washington is owned by the Panama Railroad Company; the remainder are supported by The Panama Canal. The falling off of the tourist traffic resulted in a decrease in revenues of the Tivoli and Washington Hotels from 1914, of $72,158.69. During the year there was a net loss of $1,974.16 in the operation of the Hotel Tivoli, as compared with a profit of $21,271.25 during the previous year. The Aspinwall Hotel was operated at a loss of $1,409.89, but in the period between January 1 and June 30, 1915, a net profit of $621.34 was made.

The great falling off of the numbers fed in the laborers' messes during the year cut off an economical avenue for the disposal of the surplus of the hotels. This, and the general rise in prices, increased the cost of foodstuffs supplied to the hotels. The latter were running at a loss when they should be self-supporting, due largely to the fact that the hotels were not patronized generally for all the meals, and there was necessarily great waste; there was complaint also that patrons could not get the food they desired. To overcome these difficulties the cafeteria plan was established at the Cristobal Hotel on September 30, 1914. It is impossible to satisfy everyone, but after being in operation for a while it seemed to fill the needs more satisfactorily than the old table d'hôte system, so that it was extended to the Balboa Hotel on July 1 of this year. Cafeteria lunch rooms were opened, one in the basement of the administration building on September 15, 1914, and another at the Balboa shops on January 8, 1915. The Ancon Hotel was opened as a quick order à la carte restaurant on December 15, 1914, and the Pedro Miguel Hotel was turned into a quick lunch continuous service restaurant on June 15, 1915. Complaint was made that the new system necessitated a higher cost to the patrons, and to secure data on this point a record was kept for a limited period in April, 1915. From this data it was learned that the average breakfast at Cristobal cost 21.24 cents, the average lunch 29.71 cents, and the average dinner 31.42 cents, or an average per meal per patron of 27.9 cents. At the Ancon Hotel the average breakfast cost 19.5 cents, the average lunch 33.2 cents, and the average dinner 39.4 cents, or an average per meal per patron of 30.7 cents.

The net revenue for the year for the line hotels and messes was $748,239.05, a decrease of $283,950.46 from the last year, while the total cost of operation was $726,774.07, a decrease of $295,082.85, or a profit of $21,464.98; but charges for building repairs, fuel, and lights were not included for the entire year, and no charge was made for the equipment.

Mount Hope printing plant.—New equipment to the value of $3,301.10 was purchased and installed, the principal items of which were a ruling machine and a pony Whitlock press. The value of the equipment on hand as of June 30, 1915, was $36,529.31; the value of the stock on hand at the close of the year was $45,198.38; the value of material issued during the year, $83,111.94; and the value of material used in manufacture, $37,053.09. In several instances bids were invited on various printing jobs, both from commercial firms in the United States and the Government Printing Office, at Washington, and in each case the cost of doing the work on the Isthmus was under the lowest bid received.

The administration and operation of the Panama Railroad commissaries continued under the supply department during the year

For further information see Appendix F.

ACCOUNTING DEPARTMENT.

The centralization of accounting work in the accounting department, in charge of Mr. H. A. A. Smith, as auditor, with Mr. J. H. McLean as paymaster and Mr. T. L. Clear as collector, was completed during the first half of the year in accordance with the general plan for the permanent organization adopted April 1, 1914. The offices of the auditor, paymaster, and collector were moved from Empire to Balboa Heights the latter part of August, 1914. The commissary accounting office at Cristobal, the cost-keeping office at Culebra, and the offices of the local auditor and local treasurer of the Panama Railroad Company at Colon were consolidated with the accounting department in October, and the positions of local auditor and local treasurer of the Panama Railroad Company abolished. Subsequently the counting of coupons in commissaries was transferred to the department.

The auditor's office is now organized as follows:

The accounting bureau keeps the general books of the canal, does the cost keeping for The Panama Canal and Panama Railroad, except for the shops, and the accounting for the commissaries and for the general stores of the supply department. The auditing bureau audits all collections, Canal Zone, clubhouse, and coupon accounts and has charge of the force of time inspectors. The claims bureau examines all pay rolls and vouchers and handles freight claims and claims arising under the injury compensation act. The railroad accounting bureau is organized to take care of the bookkeeping and auditing of the railroad, which could not be consolidated with any similar work performed for The Panama Canal. The general inspection bureau examines the records kept by all employees receiving or having the custody of money or coupon books and supervises the transfer of accounts whenever changes are made.

The accounting for collections is governed by section 5 of the sundry civil act of August 1, 1914, section 3 of the sundry civil act of March 3, 1915, and the regulations promulgated by the President in accordance therewith. The order provides that detailed collection vouchers need not be furnished for all collections; that instead two employees, one from the office of the Auditor for the War Department and one from the office of the Comptroller of the Treasury, shall be detailed semiannually to make such examination of the records and accounts of collections of The Panama Canal for the six months just prior to the examination as may be necessary to enable them to prove the correctness of the collections not supported by collection vouchers in detail for the period examined. The first detail for this duty is now engaged in the examination of the records on the Isthmus.

The current expenses charged to operation and maintenance of the canal during the year amounted to $4,112,550.48, while $160,608.52 had been charged during the previous year, a total of $4,289,159. Tolls collected for vessels passing through the canal during the year amounted to $4,343,383.69; tolls for the prior year amounted to $14,618.68; a total of $4,358,002.37 to June 30, 1915. In addition, tolls amounting to $80,872.79 were levied on vessels of the United States—colliers, transports, etc.—which passed through the canal, but under a recent decision of the Attorney General these will not be paid.

The excess of tolls collected over the current charges for the year was $214,833.21, and for the entire period to June 30, 1915, the excess was $68,843.37. This, however, does not represent the actual financial condition, for the Attorney General decided that the maximum tolls collectible on any vessel is the amount derived from the net registered tonnage under United States measurement rules, at $1.25 per net ton, so that large refunds will have to be made, as the difference between the amount collected under the Panama Canal rules and the amount properly collectible under the law has been found to exceed $1,000 in the case of several vessels, and it is roughly estimated that the total refunds may aggregate $400,000, which will show an excess of operating expenses over collections. Refunds can not be made, however, until Congress makes an appropriation therefor, as the amounts collected as tolls were covered into the Treasury as miscellaneous receipts.

All claims for damages to vessels passing through the locks were adjusted by mutual agreement, as authorized by section 5 of the Panama Canal act; $1,878.45 were paid on this account.

Under the agreement with the Republic of Panama which requires the reimbursement to the United States for expenditures connected with the construction, operation, and maintenance of waterworks, sewers, and pavements in the cities of Panama and Colon, the expenditures to June 30, 1915, in Panama, were $1,879,282.75, and in Colon $1,744,318.87, a total of $3,623,601.62, including accrued interest to date, at the rate of 2 per cent per annum on the capital cost balance and on the proportionate cost of waterworks in the Canal Zone used for supplying water to the two cities, based upon the quantity of water consumed. For the work in Panama this interest has amounted to $217,310.37, and for work in Colon $172,260.76. There have been reimbursed to the United States $1,480,597.36, leaving a balance of $2,143,004.26 still due.

Hotel books to the number of 9,722 and 589,297 commissary coupon books were issued for pay-roll deduction, for which $136,298.43 for hotel books, and $2,853,180.28 for commissary books, were collected. Meal tickets aggregating 619,830 were issued, for which $191,634.95 were collected. There were sold for cash 7,410 hotel books to the value of $105,544.80, and 187,176 commissary books to the value of $1,326,642.50. Hotel coupons to the value of $261,543.80, and commissary coupons to the value of $250,973.92, were honored at the hotels, the use of commissary books having been substituted for hotel books in November, 1914. Commissary coupons to the value of $3,948,102.59 were honored at the commissaries.

The periodical examination of the accounts of the 200 officers and employees having the collection, custody, and disbursement of money and the issue and custody of coupon books and other items having a money value, was continued throughout the year.

The total disbursements on the Isthmus on acount of salaries and wages of employees of The Panama Canal, and on account of other items, amounted to $20,835,301.92; in addition, $6,003,824.02 were disbursed by the paymaster on account of the Panama Railroad. Disbursements in the United States amounted to $12,498,500.42, or a total of $33,333,802.34 for The Panama Canal. The collector also disbursed $3,972,922.56 on account of the Canal Zone, money orders, postal savings, and clubhouse funds.

The total regular collections during the year amounted to $10,637,666.40, of which $5,977,431.97 were repaid to appropriations, $4,357,998.37 were collected as tolls, and $302,236.06 were collected as other miscellaneous receipts. Of this last amount $223,896.86 were derived from the sale of construction material and equipment.

The reduction of outside business enterprises within the Canal Zone continued during the year, thereby depleting the Zone revenues, and Congress made provision for the payment of all expenses of the schools, post offices, magistrates courts, etc., of the Canal Zone, by direct appropriation for civil government, with the result that the revenues derived from rentals, taxation, court fees and fines, postal receipts, and interest on bank balances which have been used to meet these expenses, will hereafter be covered into the Treasury as miscellaneous receipts. The miscellaneous revenues decreased from $168,078.64 in 1914 to $90,532.69 in 1915; the postal revenues from $110,732.23 to $96,151. The audited expenditures for public improvements and schools amounted to $195,327.06; for the postal service $93,560.54. The number of money orders issued decreased from 198,009 in 1914 to 170,558 in 1915, including the orders issued without fees in lieu of postal savings certificates issued during prior years. The total money-order and postal-savings business for the year amounted to $5,657,282.84.

The canal clubhouses received a total revenue of $105,406.48, expended $110,953.86, and the balance on June 30, 1915, in clubhouse funds amounted to $21,339.50.

The first full year of the operations of the injury compensation order promulgated in the Executive order of the President of March 20, 1914, has shown satisfactory results. Employees seriously injured and the families of employees who were killed while at work are more adequately compensated than under the general law. With the payment of a smaller amount than the total compensation, employees who sustained short-term injuries are fairly well compensated and the inducement to malingery is removed. The amount allowed on account of injuries was $41,871.91, and on account of deaths $43,017.71, a total of $84,889.62. To June 30, 1915, there has been paid to employees of The Panama Canal on account of injury compensation, including $38,718.37 allowed under special acts of Congress, a total of $1,269,458.69.

The inspection of time books and work of timekeepers in the field was continued with a reduced force.

Congress has appropriated for the canal a total of $394,399,149.02 to June 30, 1915. Of this amount $14,689,873.30 were for fortifications, $750,000 cover three annual payments of $250,000 each to the Republic of Panama, $6,000 is for the expense of presenting the steam launch *Louise* to the French Government, $6,440,000 were appropriated for the operation, maintenance, and civil government of the canal and the Canal Zone for the fiscal year 1916, while $4,289,159 were used for operating and maintaining the canal to the end of the fiscal year 1915, and $2,225,000 is the amount of stock on hand paid from construction funds that will be required for the maintenance of the canal and properly chargeable against operation and maintenance. This leaves an amount of $365,999,116.72 which has been appropriated for the construction of the canal and its adjuncts. This amount, less $2,000,000 appropriated for colliers, or $363,999,116.72, is the amount chargeable against the total authorized bond issue of $375,200,900. Up to June 30, 1915, $6,563,067.88 were returned to the Treasury as miscellaneous receipts other than collections on account of tolls. This amount deducted from the available appropriations for construction, namely, $363,999,116. 72, leaves $357,436,048.84 as the amount expended for the canal, including the amount available for work still in progress. This total cost of the canal and its adjuncts will be reduced by receipts from the sale of construction material and equipment, payments by the Republic of Panama for the amount expended in the cities of Panama and Colon on account of waterworks, sewers, and pavements, and by the value of buildings and other public works, and equipment and plant transferred to the Army and the Alaskan Railway Commission without any actual payment therefor. In addition there will be constructed a dry dock, two coaling stations, and terminal piers not contemplated when the estimates of 1908 were prepared, and the payment of over $1,000,000 for injuries under law and regulations not existing at the time, and therefore not included.

Cost keeping.—The total division charges during the fiscal year for construction of the canal proper were $2,858,708.02, and for auxiliary works and structures $9,205,892.29, a total of $12,064,600.31. The total cost of the canal and auxiliary works to June 30, 1915, is shown in detail in accounting department Table No. 6. All overhead expenses, including the expenses of civil government and of sanitation, have been distributed to the various units of construction. The units of construction comprising the canal proper, with the exception of dredging excavation and the construction of the east breakwater at Colon, were practically completed prior to this fiscal year, the charges made during the year being principally for finishing and for belated charges. In Gaillard Cut 1,960,617 cubic yards were removed at an average division cost of $0.4226 per cubic yard; at the Atlantic entrance 12,514 cubic yards at an average division cost of $0.3169 per cubic yard; in Miraflores Lake 40,810 cubic yards at an average division cost of $0.2595 per cubic yard, and at the Pacific entrance 498,400 cubic yards at an average division cost of $0.4820 per cubic yard. In addition, there were removed in maintaining the channel at the Atlantic entrance 1,233,301 cubic yards at an average division cost of $0.1017 per cubic yard; in Gaillard Cut 4,710,566 cubic yards at an average division cost of $0.3467 per cubic yard; in Miraflores Lake 8,662 cubic yards at an average division cost of $0.2601 per cubic yard, and at the Pacific entrance 43,612 cubic yards at an average division cost of $0.1979 per cubic yard. The construction dredging in Gaillard Cut cost an average of $0.4226 per cubic yard, and the average division cost of excavation by steam shovels in that section to June 30, 1914, was $0.7066 per cubic yard, a difference of $0.2840 per cubic yard in favor of excavation in the wet. As practically all the dredging this year was done at Cucaracha, the cost of excavating in the dry at that point would have been much higher than the average of all previous dry excavation in Gaillard Cut, due to the large expense of maintaining tracks in the slide. During the fiscal year just ended the division expenses for the construction of the east breakwater at Colon were $1,185,348.51, making a total of $1,561,674.37 to date. During the fiscal year $48,458.19 were expended in filling in low places in the Gatun Dam, which expenses were charged to maintenance, and in surfacing the backfill at the locks at Gatun, Pedro Miguel, and Miraflores, $32,742.32, $20,631.20, and $19,207.87, respectively, these latter items being charged to construction.

To the end of the fiscal year there had been expended for the construction of the terminal facilities at Cristobal $2,189,885.88, of which $2,049,695.24 were for the coaling plant and $140,190.64 for the fuel-oil plant. For the terminal facilities at Balboa there had been expended $10,649,893.92, of which $433,200.83 were for preliminary work, etc., $681,134.27 for preparation of site, $41,137.01 for a concrete drainage culvert over the Curundu River, $1,176,582.70 for dredging the inner harbor, $1,796,690.06 for the construction of the main dry dock, $883,036.35 for the construction of the coaling plant, $376,036.35 for the excavation on the entrance basin to the dry dock and coaling plant, $2,788,221.14 for the construction of the shops, $165,135.17 for the construction of the shop office building, $511,566.08 for the construction of the storehouses, $1,605,466.65 for the construction of the quay walls and pier, and $241,636.83 for the construction of the fuel-oil plant and for dredging a berth for the oil ships.

In the preparation of the permanent townsites, there have been expended to the end of the fiscal year $927,678.68 for the town of Balboa-Ancon, $116,672.82 for Pedro Miguel, $151,986.63 for La Boca, $53,062.30 for Cristobal, and $13,694.07 for Gatun, a total of $1,263,094.50. Expenditures at Cristobal and Gatun were wholly for underground duct lines and street-lighting systems, while those at the other towns include roads, sewers, water mains, etc.

There have been expended to the end of the fiscal year $2,827,383.74 for permanent buildings, distributed among the various classes of buildings as follows: Administration building, Balboa Heights, $923,294.49; other office buildings, $671.76; storehouses, $57,206.07; dwellings for gold employees, concrete, $1,085,750.08, new wooden buildings $17,459.65; reerected wooden buildings, $229,541.02; dwellings for silver employees, $193,004.71; hotels and messes, $10,194.91; miscellaeous buildings, $107,171.69; health-department buildings, $183,883.76; and $19,205.60 for designing and drafting.

The above amounts are the direct division costs and do not include overhead expenses.

During the fiscal year the gravel plant at Gamboa produced 377,871 cubic yards of sand and gravel at an average cost of $0.7104 per cubic yard.

Since January 2, 1915, when the electric power producing system was permanently placed in operation, there have been distributed 13,965,587 K. W. H. The average cost of production per K. W. H. has been $0.0067 and the average distributed cost $0.0099.

For further details attention is invited to Appendix H.

EXECUTIVE DEPARTMENT.

The department embraces the various civil functions pertaining to the government of the Zone, the courts, the offices of the special attorney, the district attorney, and the Canal Record. It is in charge of Mr. C. A. McIlvaine, executive secretary, acting under the Governor. During the period July 1, 1914, and September 1, 1914, the work of the executive office was carried on with the same force and under practically the same conditions that existed on the date the new organization went into effect, i. e., April 1, 1914. Between August 20, 1914, and September 14, 1914, the general administrative offices of the canal were transferred from Culebra, Empire, and Ancon to the new administration building at Balboa Heights, and on October 15, 1914, the general offices of the Panama Railroad Company were likewise located in the new building. Incident to this change, the scope of the executive office broadened very materially and, following the original plan as outlined in the report of the executive secretary for the fiscal year ended June 30, 1914, practically all of the clerical work (with the exception of the accounting department), previously handled by the different departments and divisions, was assigned to the executive office force. It became necessary, therefore, to substantially increase the force of the executive office in order to handle the work properly. This consolidation of the clerical forces under the executive office was accomplished by the transfer of employees from other departments and divisions and resulted in a reduction in the total force.

The following bureaus were established on a permanent basis, under direction of the executive secretary, assisted by the chief clerk:

Correspondence bureau.—This bureau furnishes stenographic and typewriting service for all offices in the administration building; prepares monthly and annual reports, estimates, and statistical data; and does such other clerical work as it may be called upon to perform.

Personnel bureau.—This bureau handles all matters pertaining to the personnel of The Panama Canal and the Panama Railroad Company.

Record bureau.—This bureau has charge of the records of The Panama Canal and the Panama Railroad; the indexing and filing of papers; receiving and mailing all correspondence, and transmittal of all papers between offices; the consolidation of records; the indexing and filing of maps and drawings; the Panama Canal library; the publication of circulars; and the supervision of the executive office printing plant.

Timekeeping bureau.—This bureau is charged with keeping the time of all employees of The Panama Canal and the Panama Railroad Company, the issuance of coupon books, and the preparation of force reports.

Property and requisition bureau.—This bureau is charged with keeping the property records of The Panama Canal and Panama Railroad (excepting the division of terminal construction and the mechanical division) and the preparation of work requests and local requisitions for material.

General bureau.—Included in this bureau are the surveying officer and his assistant; the official photographer and his assistant; one inspector; one inspector of motor cars, and the operation of motor cars (railroad).

DIVISION OF CIVIL AFFAIRS.

Effective July 1, 1914, the division of posts was incorporated with the division of civil affairs. The Canal Record was transferred to the division of civil affairs July 22, 1914.

Customs bureau.—Since the canal was opened to traffic there has been a gradual increase in shipping at Balboa and Cristobal. The total number of vessels entered at the two ports was 2,135, the total number of vessels cleared 2,125. Customs regulations intended to provide simple rules for the entry and clearing of vessels and the releasing of cargo, with due regard for the interests of the Republic of Panama, but without impairing the complete administrative jurisdiction of the government of the Canal Zone over the terminal ports, were published in July and August, 1914. They were amended in the direction of the greater simplicity in the following November. These regulations meet all present requirements and can be readily amplified when occasion requires, The President, in his Executive order of January 27, 1914, provided that the executive secretary should in person, or through one of his assistants, perform the duties of a shipping commissioner. In conformity with this order, the chief of the division of civil affairs was designated shipping commissioner for the Canal Zone and the customs inspectors at Balboa and Cristobal were designated deputy shipping commissioners. There were 1,033 seamen shipped on American vessels during the year and 941 seamen discharged. Relief was afforded shipwrecked seamen, and action was taken to discourage desertion and apprehend deserters. The customs bureau has continued, with the assistance of the police, to administer the President's Executive order of January 9, 1908, extending to the Canal Zone certain Chinese exclusion laws of the Republic of Panama. Customs inspectors have inspected and sealed 2,828 cases of household goods shipped by employees to the United States and have certified 945 invoices covering other shipments to the United States.

Administration of estates.—During the year 268 estates of deceased and insane employees of The Panama Canal and the Panama Railroad Company were administered, and there were 14 estates in course of settlement on June 30, 1915. Of the estates settled, 174 were delivered to the consular or diplomatic representatives in the Republic of Panama or the United States of the countries of which the deceased or insane person was a citizen or subject; 86 were settled direct with the heirs; 4 estates were settled with administrators; 2 estates were paid to persons who had recovered their sanity; the net proceeds of 1 estate was applied to extinguish a claim; and 1 estate was escheated to the Government of the Canal Zone. The amount involved in the settlement of the 268 estates was $15,524.01.

Licenses and taxes.—By the provisions of the Executive order of the President, dated October 13, 1914, license and tax laws of the Canal Zone were revised so that many of the fees and rates were reduced and some taxes which had been inherited from the Colombian régimé were abolished. A complete statement of the licenses issued and taxes collected during the fiscal year will be found included in statement of Canal Zone revenues printed as an appendix to the auditor's report.

Postal service.—There were 13 post offices in operation at the beginning and at the close of the fiscal year. One new office, Balboa Heights, was opened July 15, 1914, and one office, Frijoles, was closed September 30, 1914. The total receipts of the post offices from all sources were $95,794.36, as compared with $110,742.23 in the preceding year. The expenses were reduced from $175,263.42 in 1914, to $151,121.59 in 1915. There were 170,558 money orders issued during the year of a total value of $3,948,762.86, on which fees were collected amounting to $13,169.55. Compared with the preceding fiscal year there was a decrease of 28,270 in the number of orders issued and a decrease of $80,601.97 in the aggregate amount and a decrease of $6,238.56 in fees collected. For the postal savings system established in the Canal Zone by the President's Executive order of September 8, 1911, there was substituted, under authority of an Executive order dated September 5, 1914, a system of deposit money orders which greatly simplified the clerical work in the post offices and in the office of the auditor, without in any way affecting the interests of depositors. Postal savings deposits on June 30, 1914, amounted to $498,481. The deposits on June 30, 1915, represented by unpaid postal savings certificates and deposit money orders amounted to $477,551. There was also on deposit on June 30, 1915, $33,781.70 in the form of ordinary money orders issued by and drawn on Canal Zone post offices in favor of the remitter. In the registry division of the post offices, 126,134 parcels and letters were handled, a decrease of 14,955 registered letters and parcels as compared with the preceding fiscal year. Approximately 60 per cent of the registered matter handled was official and no revenue was derived from it.

Customs duty was paid to the Government of Panama to the amount of $6,475.21 on 5,506 mail parcels for nonemployees and prohibited articles imported by employees, as compared with $8,751.33 for the preceding fiscal year. The Cristobal exchange office made 1,114 dispatches of mail by ocean carriers, of which 198 were for the United States and 916 for foreign administrations.

By the Executive order of August 14, 1914, the penal clauses of the United States Postal Laws and Regulations were extended to the Canal Zone. There has been one prosecution and one conviction under the order. Various improvements in the service have been made to expedite the routine handling of mails, increase revenue, and reduce the expenses of operation.

Canal Record.—The Canal Record was continued after January 1, 1915, as a weekly paper for the publication of shipping news, statistics of traffic, Executive orders, official documents, notices, and circulars. Confining the scope of the paper within these limits permitted a reduction of the force employed for its compilation to one man; at the same time, reasonable restrictions were placed on the free distribution of the Record and provision was made for paid subscriptions at $1 per annum, domestic, and $1.50 per annum, foreign. The cost of publication for the fiscal year was $13,585.15, as compared with $23,227.83 in 1914. Collections on account of subscriptions and the sale of extra copies and bound volumes amounted to $498.97.

POLICE AND FIRE DIVISION.

A general reorganization of the police and fire division was effected October 1, 1914, and resulted in a total reduction of 26 men in the police force and 2 men in the fire force. There was also a reclassification of titles and rerating of salaries for both forces. On September 1, 1914, two police districts—Balboa and Cristobal—were established, coextensive with the judicial subdivisions of the Canal Zone. The Empire district was abolished. The Ancon police station was used as a central station until November 30, 1914, when the headquarters of the district were transferred to the new police station at Balboa.

During the year 5,157 persons were arrested, an increase of 246 as compared with the previous year. Of this total number, 4,107 were convicted. There were 8 homocides in the Canal Zone during the year. In 7 cases the supposed perpetrators were brought to trial; 3 were convicted and 4 were acquitted or dismissed. In the eighth case evidence was procured against a resident of Panama, whose extradition was refused. There were 6 suicides during the year. The police records of 1,103 persons who had been previously arrested, were compiled, sworn to, and submitted to the courts for their information, as part of the routine work of the division. There was a monthly average of 114 persons serving sentence in the common jails of the Canal Zone. They were employed continuously on public improvements and for janitor service in public buildings. The total value of their labor, reckoned at 10 cents an hour, amounted to $17,104.10. Several of these common jail prisoners attempted to escape while working on the roads, but they were quickly recaptured in all cases. At the penitentiary 66 convicts were received and 83 completed their terms of imprisonment and were discharged. The labor of the convicts was employed continuously on the construction of the road from Empire to Gamboa. The value of their labor, at 10 cents an hour, amounted to $12,497.40. The cost of subsisting and guarding them amounted to $21,956.64. Nine convicts were pardoned, and one prisoner under sentence to the penitentiary was pardoned on account of poor physical condition and deported before he began his sentence. No convicts escaped during the year.

Continuous guard duty was performed by police officers at all of the locks. On April 15, 1915, on account of the withdrawal of the troops from Pedro Miguel and Miraflores Locks, the police guard at those two places was increased. The Chagres River and Gatun Lake were patrolled by launch. There has been a similar patrol of the harbors of Balboa and Cristobal, although the division did not have the exclusive use of launches for this purpose. A suitable launch for police work at Balboa was ordered toward the close of the year, but is not yet in service. Three motorcycles were put in use October, 1914, for the control of automobile traffic and for special emergency service. The work of depopulating the Canal Zone was continued, and, in this connection, 1,136 privately owned houses were destroyed by the police, or removed by the owners when notice was served on them. One hundred and thirty-four persons were deported from the Canal Zone by the police; of that number 73 were convicts who had completed terms in the penitentiary, and 61 were persons who had been convicted of misdemeanors, whose presence in the Canal Zone was deemed inadvisable. Coroner's investigations were held in 103 cases of death, of which 36 were due to accidental drowning and 35 to accidental traumatism. Investigations were made in 294 cases of accidents involving personal injury, and detailed reports of the circumstances were submitted.

The general conditions on the Canal Zone in the matter of fire protection were much improved during the year. This was brought about by the construction of concrete houses in place of the frame buildings previously used, by better streets and roads, new pump stations, hydrants, and by means of the general cleaning up of waste material and rubbish on the Isthmus. A new concrete fire station at Balboa was occupied on January 11, 1915. The fire stations at Empire and Culebra were transferred to the Army, together with a certain amount of equipment at each place. A new motor-driven hose wagon was purchased during the year and installed at Balboa to supplement the automobile fire engine. The stock of hose on hand was renewed, and 50 additional Pyrene extinguishers were purchased and installed. There were 129 fires and 13 false alarms reported during the year. The most destructive of these fires occurred in the city of Colon on the afternoon of April 30. About one-third of the town was burned down, and it was with great difficulty that the fire was prevented from spreading to Cristobal. The damage to the Panama Canal property was estimated at $12,000 and the damage to Panama railroad property at $10,000. The total loss resulting from this fire is estimated at $1,110,000. On March 8, 1915, a fire of unknown origin occurred on the mining dock at Fort Grant and caused damage estimated at $27,500. On May 4, 1915, a fire broke out in the hold of the *Pennsylvanian* of the American-Hawaiian Line shortly after the vessel had left the port of Balboa. She returned to the dock and the fire was extinguished after a two days' fight, in which the Canal Zone firemen were assisted by hired laborers and by soldiers from Fort Grant. The loss resulting from this fire was estimated at $95,000.

DIVISION OF SCHOOLS.

The schools for white children had a net enrollment of 1,146, and schools for colored children a net enrollment of 1,430. Fifteen buildings were in use for school purposes, besides two rooms in the old Washington Hotel at Colon Beach. At Balboa, four type-5 bachelor quarters were remodeled for use as a school for white children, the upper floor being used for the main high school and the lower floor for the grammar school. A school for the colored children in the Balboa district was provided by removing the Empire and Culebra white school buildings to La Boca during the summer vacation, and reerecting them as one 12-room schoolhouse. The building formerly occupied by the colored school at Mount Hope was removed to Gatun in February and reerected for the use of colored pupils. The main high school was transferred from Ancon to Balboa. The branch high school, formerly conducted at Gatun, was transferred to Cristobal. On account of the small attendance, seventh and eighth grades at Gatun were transferred to Cristobal November 9, 1914. For a similar reason, the colored school at Mount Hope was discontinued December 31, 1914, and the white schools at Culebra and Las Cascadas were consolidated on February 15 at Empire. Because of the crowded condition in the Cristobal white school, it became necessary to open a school on Colon Beach November 9, 1914, for the first four grades. The usual medical inspection of pupils in the grammar grades in white schools was made beginning October 26. Subsequently inspections of all schools were made by the district physicians of the health department once a month. No accidents occurred in connection with the transportation of school children either by train or brake. Fire gongs were installed in all of the larger schools and at least once a month a fire drill was held in every school. Each school is equipped with hand extinguishers and teachers and janitors have been instructed in their use. Spanish was introduced in the four upper grades of the elementary white schools at Cristobal, Pedro

Miguel, Ancon, Corozal, and Balboa at the beginning of the year and continued throughout. A revised course of study has been practically completed. It will be printed during the summer vacation period and adopted at the beginning of the next school term. The foundations were laid for a system of industrial training, conducted as an integral part of the Canal Zone school system, with the cooperation of the mechanical division and the commissaries. A supervisor of industrial training, competent to reorganize this extension of school work, was appointed September 22, 1914. High-school and eighth-grade boys have been given employment after school hours, on Saturday, and during vacation, as salesmen and checkers in the commissaries. Courses of instruction have been conducted for apprentices in the shops, and classes in mechanical drawing and woodwork were organized in the high schools. At Balboa, Ancon, Corozal, and Pedro Miguel eighth-grade pupils were given instructions in woodwork and sewing. Industrial training will be continued next year on broader lines and with more ample equipment.

BUREAU OF CLUBS AND PLAYGROUNDS.

The bureau of clubs and playgrounds was conducted, as in previous years, under the supervision of secretaries furnished by the international committee of the Young Men's Christian Association. The clubhouse at Empire was closed July 14 and removed to Balboa, where it was reerected and opened on Christmas Eve. The building formerly used at Porto Bello was reerected at La Boca as a clubhouse for silver employees. The activities of the bureau were practically the same as in previous years, except that more money was spent than heretofore on baseball grounds, tennis courts, and other outdoor features.

THE COURTS.

In the district court 86 cases were pending at the beginning of the year, 779 cases were filed and 777 decided, leaving 88 cases pending on June 30, 1915. Of the cases decided 75 were civil, 341 probate, and 361 criminal. Court was held both at Ancon, for the Balboa division, and at Cristobal. Three-fourths of the cases heard arose in the Balboa division. There were 116 sessions of court. Five hundred and seventy-seven marriage licenses were issued by the clerk of the court and 216 deeds recorded. The sum of $5,277.16 was collected in fines, costs, and fees.

In the magistrates court for the Balboa subdivision seven cases were pending at the beginning of the year, 2,889 cases were docketed, and 2,892 cases were settled, leaving four cases pending at the close of the year. Of the cases settled 137 were civil and 2,755 were criminal. Of the criminal cases 30 were dismissed, 189 were committed to the district court, and there were 2,203 convictions and 333 acquittals. Collections on account of fines and fees amounted to $7,674.14.

In the magistrates court for the Cristobal subdivision 3 cases were pending on July 1, 1914, 2,400 cases were docketed during the year, and 2,398 cases were decided, leaving 5 pending at the close of business on June 30, 1915. Of the cases decided 164 were civil and 2,236 were criminal. The criminal cases resulted in 1,709 convictions, 337 acquittals, 69 dismissals, 9 cases compromised under sections 359 and 360 of the Code of Criminal Procedure, and 112 cases committed to the district court. A total of $5,898.38 was collected in fees and fines.

The district attorney in his annual report (Appendix L) makes the following statement with reference to jury trials in the Canal Zone, and I concur in his recommendation:

> The present district attorney is familiar with the result of jury trials upon the Canal Zone, both before and since the Executive order of July 4, 1913, authorizing jury trials in all felony cases. Before the Executive order referred to jury trials were allowed only in capital cases. Since the Executive order of July 4, 1913, the only defendants demanding a jury trial have been white citizens of the United States. Negroes and foreigners upon the Zone prefer trial by the court without a jury. Since the Executive order referred to 6 white defendants have demanded jury trials; 1 was charged with violation of the white slave act, 1 with murder, 1 with manslaughter, and 3 with assault with a deadly weapon. All were acquitted by juries. The 4 last cases were for crimes committed against negroes, and juries refuse to convict white defendants in these cases.
>
> The results of jury trials since the Executive order of July 4, 1913, have been very unsatisfactory, and I renew the recommendation made in the last annual report that the law be amended so that there may be a return to the former practice of allowing jury trials in capital cases only.

RELATIONS WITH PANAMA.

Negotiations by correspondence or personal conference between the executive secretary and the secretary of foreign affairs of the Republic of Panama included, among others, the following subjects in addition to routine matters: The issuance of transportation on the Panama Railroad to employees and officials of the Panama Government, and the abuse of the pass privilege; the granting of the commissary privilege to nonemployees with the sanction of the Republic of Panama; the decrease in infant mortality by preventing practice by incompetent midwives; filling in low land at National Exposition Grounds with material from Panama Bay; the matter of granting permission to American aviators to make flights over the city of Panama during the National Exposition, and the Panama Canal exhibit; examination by officials of the Republic of Panama of records of The Panama Canal from 1910 having reference to the reimbursement of the United States for the cost of waterworks, sewers, and pavements constructed within the cities of Panama and Colon, and the matter of reduction of water rents in the city of Colon; construction of a telegraph line for the Republic of Panama between Panama City and Empire and thence to the Canal Zone boundary in the direction of the town of Paja; transmission of messages over the Panama Canal telephone line to El Vigia; the contract and revocable license respecting the rental of two wires in the transisthmian duct line of the Panama Railroad between Panama and Colon; the strict enforcement of laws restricting immigration so as to prevent the landing of immigrants for whom there was little likelihood of employment, and who were likely to become public charges; the delay in the promulgation through the Republic of Panama Official Gazette of sanitary ordinances prepared by the Panama Canal health officials; the health ordinances respecting the registration of births and deaths in the cities of Panama and Colon; the increase of import duties on goods entering the Republic of Panama and the proposed requirement that The Panama Canal secure a permit in each instance for the clearance of materials and goods through the Panaman customs; the regulation of private hospitals in the cities of Panama and Colon and the reduction in rates at Colon Hospital for Panaman residents of Colon; unauthorized entry upon Canal Zone territory and exercise of police powers by Panaman police in pursuit of fugitives; the delivery or orders of sequestration or embargo decreed by Panaman courts against the wages of Panama Railroad employees, and the matter of maintaining a representative in the city of Colon by the Panama Railroad Company to receive such orders of garnishment; the segregation of stables in the city of Panama; the proposed sale of the American wharf in the city of Panama to the Republic of Panama, and the lease entered into between the Panama Railroad Company and Messrs. Pinel Bros. for the use of the wharf in the city of Panama known as the "English Wharf"; the changes recommended to avoid confusion between lighthouses established by The Panama Canal and the Republic of Panama; the right of the Republic of Panama to refuse to honor a request for the extradition of a citizen of Panama from the Republic of Panama to the Canal Zone; the boundry convention between The Panama Canal and the Republic of Panama, changing the boundaries in the district known as Las Savanas and in the waters of Colon Bay; the payment of 40 per cent of the face value of United States postage-due stamps used in Canal Zone post offices to the Republic of Panama; the fire in the city of Colon April 30, 1915, the rebuilding of the city, and the housing and care of the refugees; the construction of lighthouses at Cape Mala and Bona Island; the prevention of the sale of liquor near Canal Zone boundaries; and the right of Panama to collect import duties on material for fuel-oil tanks in the Canal Zone.

It has been difficult to secure the cooperation of Panama respecting measures necessary for the public health in Panama City and Colon, and it seems probable that (as contemplated by the treaty) greater executive powers may have to be exercised in those cities to accomplish the ends desired.

The Taft agreement has become in many respects disadvantageous to both Governments and should be superseded by an agreement more in accord with our present mutual needs and with our rights under the treaty.

For further particulars attention is invited to Appendix J.

LAW.

During the year Judge Frank Feuille continued as special attorney for the purpose of codifying the laws of the Canal Zone and defending the interests of the United States before the Joint Land Commission in the acquisition of lands under private ownership which are being taken over in accordance with the Executive order of December 5, 1912. He also acted as adviser to the Governor and the various heads of departments in matters relating to the canal organization and administration and affairs arising between the Canal Zone and the Republic of Panama. The district attorney, Mr. William K. Jackson, resigned his office on June 18, 1915, and under date of June 19, 1915, Mr. Charles R. Williams was appointed to succeed him.

A number of Executive orders of legislative character were issued, the more important of which were: The order relating to the duties of the clerk of the district court and his assistant; requiring ocean-going vessels to be equipped with wireless; authorizing the board of admeasurers to administer oaths to witnesses and to compel their attendance; setting aside certain area of lands in the Canal Zone for the naval radio stations; prescribing the duties of constables; reorganizing the board of health of the Canal Zone; relating to postal crimes in the Canal Zone; requiring litigants to give security for costs in civil actions; prescribing rules for the government of motormen and persons in control of street cars at street, road, and railroad crossings; to establish a postal savings bank; and relating to the compensation to be paid injured employees of The Panama Canal and the Panama Railroad. An Executive order, dated April 27, 1915, changed the name of Culebra Cut to Gaillard Cut, in honor of the services rendered by the late Lieut. Col. D. D. Gaillard, United States Army, while a member of the Isthmian Canal Commission and division engineer of the central division, which included Culebra Cut.

The work of revising the laws of the Canal Zone so as to adapt them to the change from the construction period to that of the operating period of the canal was checked by a decision of the Attorney General, who held that the President was without power to alter or amend Executive orders issued prior to the Panama Canal act. It had been assumed that the authority granted to the President by the Panama Canal act, which directed him to abolish the commission, thus discontinuing the old system, and required him thereafter to complete, govern, and operate the canal and to govern the Canal Zone, carried with it the implied authority to enact police rules necessary to make the power effective. The organization required the enactment of Executive orders of a substantive nature as well as administrative, but the adverse opinion rendered by the Attorney General brought the whole matter to a halt. The question of revising the laws in order to adapt them to the new conditions, and submitting them to Congress for enactment, is not a practical one, for the canal and its adjuncts present problems that are entirely new in administration.

Although the canal is now operated, the construction period is still on, and the defensive measures provided for the canal require the maintenance of a large body of troops, and the laws must be drafted so as to harmonize the various elements, or friction and inefficiency will result. The opening of the canal to traffic has brought it into close contact with the world's commerce, and there is not sufficient scope in the old Executive orders to permit the President or his representative on the Isthmus to meet the questions which will constantly arise under the new order of things. A system of laws and regulations sufficiently elastic can not be drafted at once to meet the new conditions as they come. Changes and modifications in the existing laws will be necessary until the transition period is entirely over and the new organization firmly settled. The Panama Canal act should be modified so as to permit the President to make such modifications when the necessity therefor arises.

The land office of The Panama Canal, which also has charge of the lands of the Panama Railroad Company, continued under the jurisdiction of the special attorney. During the past year the land office settled by private agreement and paid 1,462 claims, aggregating the sum of $351,306.64, making a total of 3,595 claims settled and paid from January 1, 1913, to June 30, 1915, aggregating the sum of $507,825.14.

The Joint Land Commission continues in session, and the progress heretofore made gives little hope of its concluding its duties within a reasonable time in the future. One of the American commissioners, Mr. David Marks, died on June 17, 1914, and Mr. Nicholas Cornet was appointed a member of the commission on September 17, 1914. In the interval the expense of the commission continued with the exception of the pay of one commissioner, and nothing could be accomplished during this time. During the fiscal year the Joint Land Commission rendered 79 awards, comprising 85 docket numbers, aggregating the sum of $161,667.16. Ten of the awards were for land claims and the others for improvements only. The commission dismissed 377 cases, 321 of which dismissals were based upon private settlements previously effected between the claimants and the land office. On March 27, 1915, the six months period within which claims could be filed, terminated, and on that date 3,593 claims had been filed, including several hundred that had been listed by the commission in 1913 on its own motion, and for which no formal claims had been filed. Judge L. M. Kagy, one of the American commissioners, left for the United States on June 24, 1915, in consequence of which the commission is again inactive.

A number of licenses revocable at will, which provide that no compensation shall be paid to lessees for improvements in case the license is terminated, were issued to steamship companies at Cristobal for lots on which to build steamship offices and residences for company agents; for the erection of tanks for the storage of fuel oil at Cristobal and Balboa; to the Masonic Order for the erection of a temple at Ancon; and to various religious denominations and benevolent associations in the Canal Zone, for the purpose of their respective organizations. All of these licensees are required to pay a reasonable ground rent, except in the case of religious and benevolent organizations, in which cases a nominal rent is charged.

For further details attention is invited to Appendix K.

WASHINGTON OFFICE.

The work of the Washington office continued in charge of Maj. F. C. Boggs, United States Army, and the organization remained as previously reported. The scope of the work handled was about the same as previously reported. Due to the continued effort to reduce the supply of material on the Isthmus to a minimum, the work of the purchasing department was even greater than during the previous fiscal year. The result has been a large increase in the number of orders, the average value of each order, however, being considerably reduced below the average of former years.

During the year 899 persons within the United States were tendered employment for duty on the Isthmus in grades above that of laborer, as compared with 2,248 for the previous year; 652 accepted and were appointed, covering 59 different classes of employment. The total amount of purchase orders placed was $7,307,689.34, the principal items of equipment purchased being as follows: Valves for Dry Dock No. 1, $49,100; pumping plant for Dry Dock No. 1, $133,056; six sets of spare regulating valves for locks, $41,100; granite for Dry Dock No. 1, $22,895.20; one 15-yard dipper dredge, $377,500; and three 1,000-yard steel dump scows, $187,980. Other principal items purchased included 950,000 pounds of explosives, 26,681,844 feet of lumber, 25,541 ties, and 9,306 piles. During the year 556,777 barrels of cement were purchased.

For further details attention is invited to Appendix M.

SANITATION.

The health department was charged with the care of the sick and injured of the Canal Zone, the prevention of disease in the Canal Zone and the cities of Panama and Colon, street cleaning and garbage removal in the latter cities, and all matters relating to quarantine. The department continued in charge of Lieut. Col. Charles F. Mason, United States Army.

Vital statistics.—With the exception of one case of smallpox, which was brought in on the steamship *Panama*, and one practically recovered case brought in on the Pacific mail steamship *Newport*, no cases of quarantinable diseases originated on or were brought to the Isthmus during the year. Health conditions were very good. The total admission rate of employees to hospitals and quarters was 337.21, compared with 473.15 for 1914; to hospitals alone 204.18, compared with 299.62 for 1914; for disease alone 156.81, as compared with 220.62 for 1914.

The total death rate was 5.72 as against 7.92 for 1914, and the death rate of disease alone 3.61 as compared with 5.17 for 1914. This means that had the death rate for disease for 1915 remained the same as for 1914, we would have had 59 deaths of employees more than we did have.

With regard to malaria, which is our principal cause of disability, the hospital admission rate was reduced 20 per cent, and the death rate more than 32 per cent since 1914.

The admission rate for typhoid fever was reduced more than 76 per cent during the year; the admission rate for dysentery 50 per cent, and the death rate for pneumonia more than 39 per cent.

In the Canal Zone the total death rate from disease was reduced from 14.46 in 1914 to 11.77 in 1915; in Panama City from 34.25 to 30.74, and in Colon from 24.12 to 21.25.

Division of hospitals.—Two of the wards at Ancon Hospital were condemned during the year as unsafe and their use discontinued.

The average daily number of patients in the hospital proper during the year was 528; the highest number in any one day 678 and the lowest number in any one day 407.

During the month of April the transfer of the insane department at Ancon Hospital to the farm at Corozal was completed and the name of the institution was changed to "Corozal Hospital for the Insane."

Building No. 1 at Colon Hospital, which was badly damaged and rendered unsafe for occupancy in the storm of February 9, was demolished and removed, and later building No. 17 was demolished, to make way for the new hospital building on which construction work was begun in June. The average daily number of patients constantly under treatment in this hospital was 40; the highest number in any one day 60, and the lowest number in any one day 24.

There was a large increase in the number of patients at Palo Seco Leper Asylum, and it was necessary to provide additional buildings for their accommodation.

The number of district dispensaries was reduced from 10 at the close of 1914 to 7 at the close of 1915, and 2 of these do not require a physician.

The new concrete storehouse at Ancon was completed and occupied in January last.

Sanitary division.—The number of sanitary inspection districts at the close of the year was 6 as compared with 9 at the close of 1914. Those abandoned were turned over to the military. A large number of new sanitary ditches of a permanent nature were constructed during the year.

The large hydraulic fills which are being made in the vicinity of Balboa, Ancon, Panama, and Mount Hope, have given much trouble and expense in the control of mosquito breeding along their borders, but eventually will be of great assistance from a sanitary point of view.

The building regulations of the Canal Zone were rendered so as to require future construction to be rat proof.

Increased attention was given to the Canal Zone schools with a view to preventing the spread of contagious diseases and to improve the health and sanitary conditions of the pupils.

Panama.—The rapid growth in the area and population of the city, about 33 per cent in the last two years, has greatly increased the work of the health department. The suburbs have been extended into very malarious districts, rendering necessary a vast amount of new drainage, jungle clearing, etc. Nearly 12 miles of new ditches were dug and 75 miles of old ditches cleaned and maintained.

The street-cleaning work has grown to such proportions that it has been impossible to do it for the amount estimated by Col. Gorgas in 1912. However, it was kept at the lowest cost possible to accomplish fairly satisfactory results, and the Panama Government has been notified that we wish to amend our present agreement so as to increase the allowance made by it from $38,000 to $50,000 per annum.

Special effort was made to clean up and reduce the number of filthy stables with which the city is infested, and to assist in accomplishing this result the Panama Railroad is constructing model stables to be rented at a minimum cost.

Colon.—The great fire in Colon on April 30, which destroyed some 23 blocks and rendered thousands of people homeless, added considerably to the work and expense of the health department, but owing to the great care which was taken in rendering their temporary habitations as sanitary as possible, there was no increase in the sickness or death rate from this cause.

The large fill which was made some years ago in the rear of the old quarantine station behind the Panama Railroad stables has recently become an active breeding area for anopheles mosquitoes, this on account of the rank growth of grass and the uneven settling, causing large concealed pools which are difficult to drain This area will have to be maintained in the future at considerable expense unless further filling and grading is done.

Quarantine.—During the year the quarantine station at the Pacific end was removed from Culebra Island to the Balboa dump and is now in full operation on the new site. A landing is being constructed on the French canal opposite the station which will considerably facilitate the quarantine work.

At the Atlantic end a portion of the old Colon Hospital was fitted up as a quarantine station and it is proposed to construct a landing opposite this point as soon as the east breakwater affords sufficient protection.

While the number of passengers inspected during the year was not so large as in 1914, the increase in number of vessels inspected amounted to 583.

In order to avoid as much as possible delays to ships in passage through the canal, arrangements were made to pass ships from infected ports "in quarantine," that is, by placing quarantine guards on board, with certain instructions to prevent intercourse with the shore, the quarantine period may be completed in transit.

For further details attention is invited to Appendix I.

FORTIFICATIONS.

Work was continued during the year on the gun and mortar batteries, and by the close of the year the concrete work and all of the backfill were completed. Work was in progress on the range and fire-control systems and the mounting of ordnance.

The work was in charge of Lieut. A. H. Acher, United States Army, until May 5, 1915, when he was succeeded by Lieut. Creswall Garlington, United States Army.

The following appendices are inclosed herewith:

Increase in salaries and personnel, submitted in compliance with law, Appendix N.

Laws recently enacted affecting the canal, and executive orders issued during the year, Appendix O.

Chart showing the organization effective July 1, 1914, Appendix P.

Respectfully submitted.

Geo. W. Goethals,
Governor, The Panama Canal.

Hon. Lindley M. Garrison,
Secretary of War, Washington, D. C.

APPENDIX A.

REPORT OF THE ENGINEER OF MAINTENANCE.

THE PANAMA CANAL,
OFFICE OF THE ENGINEER OF MAINTENANCE,
Balboa Heights, Canal Zone, July 15, 1915.

SIR: I have the honor to submit the following report of operations for the fiscal year ended June 30, 1915, under the supervision of the engineer of maintenance:

Col. H. F. Hodges, now brigadier general, United States Army, continued as engineer of maintenance until he was relieved from duty with The Panama Canal on January 1, 1915, on which date he was succeeded by the undersigned.

So far as matters within the jurisdiction of this office are concerned, the past fiscal year has marked the completion of constuction work and the beginning of the period of operation and maintenance.

The division of erection, which at the beginning of the year was charged with the completion of the various machinery installations in the locks and spillways, the construction of power plants and allied matters, was abolished on July 15, 1914. The small amount of remaining construction and installation work at the locks was turned over to the lock superintendents, and the completion of the transmission lines and the operation of the power plants to the electrical engineer. Thereafter the organization of the work under the engineer of maintenance has been as follows:

Operation and 'maintenance of locks.—Capt. Wm. F. Endress, United States Army, superintendent of Gatun Locks, until May 1, 1915, when relieved by Capt. T. H. Dillon, United States Army; Mr. F. C. Clark, superintendent of Pedro Miguel and Miraflores Locks, with Mr. R. H. Whitehead as assistant superintendent.

The electrical division.—Capt. W. H. Rose, United States Army, electrical engineer, with Mr. Hartley Rowe as electrical superintendent.

The division of municipal engineering.—Mr. Geo. M. Wells, resident engineer, until the completion of the Miraflores waterworks and purification plants, when he was transferred to other duties and was succeeded by Mr. D. E. Wright as municipal engineer.

The office engineer.—Mr. A. B. Nichols, who resigned on October 12, 1914, and was succeeded by Mr. C. J. Embree.

The section of meteorology and hydrography.—Mr. F. D. Willson, chief hydrographer, with Mr. R. Z. Kirkpatrick as assistant.

The section of general surveys.—Mr. O. E. Malsbury, assistant engineer in charge.

Lock Operation and Maintenance.

ORGANIZATION.

The division of lock operation and maintenance is subdivided into two principal heads, the "Atlantic locks" and the "Pacific locks," with their respective gold and silver organizations to take care of the operation and maintenance of all machinery and equipment. There is attached hereto a chart (plate No. 121), giving an outline of this organization as it existed on June 30, 1915.

The force required during the past fiscal year for the operation and maintenance of the locks was a variable one, as is indicated by the following table:

Month.	Gold.	Silver.	Total.
July	226	1,131	1,357
August	188	948	1,136
September	121	808	929
October	117	741	858
November	125	753	878
December	122	824	946
January	118	750	868
February	122	739	861
March	114	727	841
April	120	787	907
May	118	878	996
June	116	572	688
Average	133.9	938.7	1,072.6

CONCRETE LAID IN ALL LOCKS.

Practically all of the plain and reinforced concrete required for the construction of the locks was in place before the beginning of the last fiscal year. A total of 1,509 cubic yards of concrete was laid for construction and maintenance purposes up to the 30th of November, 1914, this material being placed by the division of lock operation and maintenance under the direction of the lock superintendents. All concrete laid in the locks after November 30 was charged to maintenance.

LOCK MACHINERY.

Practically all of the lock machinery had been placed complete by the beginning of the past fiscal year. The principal exception is the installation of the chain-fender machines, which were installed by the lock forces at periods when they were not occupied with the lockage of vessels. The last chain was installed on June 25, 1915.

CHAIN-FENDER SUMP PUMPS.

The following table will give the dates of completion of the chain-fender sump pumps at each of the locks:

	Electrical installation completed.	Mechanical installation completed.
Gatun, 16 pumps	Nov. 30, 1914	Nov. 30, 1914
Pedro Miguel, 16 pumps	Sept. 23, 1914	Sept. 4, 1914
Miraflores, 16 pumps	June 30, 1915	Sept. 4, 1914

These installations were somewhat delayed by the fact that it was found advisable to increase the height of the motors above the sump pits, in this manner increasing the capacity of the sumps by a very considerable amount, and allowing the pump motors to operate less frequently. The necessary machine work for making this change was accomplished by the mechanical division, the work of installation being handled by the lock force.

CHAIN-FENDER MACHINES.

The work on the chain-fender machines, including the installation of the chains, was completed as follows:

	Electrical work completed.	Mechanical work completed.
Gatun	Nov. 30, 1914	Nov. 20, 1914
Pedro Miguel	Oct. 28, 1914	Dec. 12, 1914
Miraflores	Aug. 22, 1914	June 25, 1915

The chain-fender machines were furnished by the United Engineering & Foundry Co.

CHAINS FOR FENDER MACHINES.

Owing to the massiveness of the chains used on the fender machines, considerable difficulty was encountered in placing the orders, and in one case it was necessary to place a new order after one contractor had spent over three months trying to produce a satisfactory chain. The following table gives a list of the contractors who furnished chains, or sections, it being understood that all fender chains are made up of three sections each, except the lower Miraflores fenders, which have four sections each:

United States navy yard, Boston, 8 complete chains and 2 sections.
Bradlee & Co., 9 complete chains and 3 sections.
Lebanon Chain Works, 2 complete chains and 2 sections.
Brown-Lenox & Co. (Ltd.), 3 complete chains.
J. B. Carr Co., 1 section.
Total, 24 complete chains and 2 spare sections.

The last section was delivered on January 6, 1915, by the J. B. Carr Co.

LOCK TRANSFORMER ROOMS.

The transformer rooms at Gatun and Miraflores have been completed during the past fiscal year. The dates of completion are as follows: Gatun (16), July 25, 1914; Pedro Miguel (8), May 15, 1914; Miraflores (12), August 10, 1914.

TELEPHONE SYSTEMS.

A description of the telephone systems was contained in the annual report for the last fiscal year.

A contract was placed with the Western Electric Co. for furnishing a complete apparatus and equipment for each of the locks, the material being delivered so that the installation was started in October, 1914, and completed in February, 1915.

Arrangements were made with the Panama Railroad Company to provide each of the switchboards in the lock-control houses with two trunk-line connections to the nearest telephone exchanges of the transisthmian telephone system; and arrangements were also made with the marine division to have their private telephone line tapped in at each of the lock switchboards to provide direct communication between the lock-control houses and the offices of the port captains.

TOWING LOCOMOTIVES.

The delivery of the towing locomotives ordered of the General Electric Co. in accordance with their alternative proposition providing a single-truck type of machine was completed by November 14, 1914. In general, the locomotives have operated in a very satisfactory manner, the most essential change which has become necessary being the provision of a low maximum speed for towing of vessels of heavy tonnage. The machines were originally designed by the contractor in accordance with our specifications and provided a maximum towing speed of 2 miles per hour. As this speed was found to be too high when handling vessels of heavy tonnage, arrangements were made to connect the two main traction motors of each locomotive in cascade, in this manner providing a maximum towing speed of 1 mile per hour. The necessary material has been purchased for changing all locomotives so as to provide for maximum towing speeds of 2 miles and 1 mile per hour, respectively, the change in speeds being accomplished by throwing over a single switch located near the operator in the locomotive cab.

Specifications have been issued and bids asked for 12 additional towing locomotives, to be similar to those now in use, the principal changes being the increased height of the cabs in order to allow the operators to have a better view of the vessels being towed in the upper chamber of all locks, and the rearrangement of the main traction motor controllers, providing for the operation of the locomotives' main traction motors in either cascade or multiple. Bids on the 12 new machines are advertised to be opened on August 16, 1915.

ARROW SIGNALS.

In order that the lock superintendents may communicate with the pilots of approaching vessels as to the readiness of the locks for handling ships, large arrow signals have been installed at the ends of each approach wall, each of these arrows being approximately 15 feet in length and arranged on a steel standard in a conspicuous location, so that they can be plainly seen by the pilots on approaching vessels. They are provided with special illumination so arranged as to mark clearly the position of the arrowheads during night lockages.

As originally installed the arrow signals were operated locally by levers, but arrangements are being made to install motor drives, so that they may be operated from the lock-control switchboards.

LOWER GUARD GATES—GATUN.

It was found that at extreme high tide wave action in spilling at the lower end of the side and center wall culverts at Gatun caused the flooding of the lower guard-gate bullwheel recesses. In order to correct this operating difficulty, arrangements were made to raise the lower guard-gate struts 12 inches, and also to provide an increased height to the bulkhead walls of the recesses. The mechanical work required for making this change was done at the mechanical division shops, and the work of installing the machinery and concrete by the lock force under the supervision of the lock superintendent.

REGULATING VALVES.

Arrangements have been made to purchase regulating valves for installation at the upper and lower ends of all middle wall culverts. Both the inlet and outlet of the center wall culverts are in the form of "T's," and the regulating valves will be installed so that the water taken in at the upper end may be obtained from either the east or west side of the center wall at will, or water discharged at the lower end of the locks may flow into either the east or west chamber, the direction of flow being controlled by the operator from the control switchboard. This regulation has been found desirable in order to prevent difficulties to vessels approaching or leaving a lock due to currents produced by the intake or discharge of water through the middle wall culvert.

LOCK REPAIR SHOPS.

During the fiscal year the permanent lock repair shops were installed to take the place of the temporary wooden structures in which the shops and offices of the lock superintendents had been located up to the end of the construction period. The reinforced concrete buildings constructed are 110 feet long and 38 feet 6 inches wide, and contain the necessary dry rooms, open and closed storage spaces, blacksmith shop, general shop, and latrines for white and colored employees.

PAINTING OF LOCK GATES.

Contract has been awarded to the American Bitumastic Enamels Co. to paint all submerged parts of the lock-gate structures and maintain them in first-class condition under a five-year guaranty. The contractor has commenced to assemble the necessary material and equipment for carrying out the work under this contract.

EMERGENCY DAMS.

The emergency dams have been operated for drill purposes several time a month in order to keep the men in practice to take care of any emergency that may arise. Care is taken to see that a sufficient number of specially trained employees are on each of the side walls whenever lockages take place, it being understood that these men are to handle the emergency dams in case of accident.

LOCKAGES.

The annual report for the fiscal year 1914 describes in detail the operation of passing vessels through the locks by means of the towing locomotives. The experience of the year just closed has increased the skill of the operators and pilots and consequently the facility of handling the vessels. No changes in methods have been found advisable, and the precision and accuracy of the ship's movement and the safety to both vessel and locks, during lockages, impress all observers.

Since the date of opening of the canal to commercial vessels on August 15, 1914, the traffic has increased to considerable proportions. In March, 1915, there were 147 commercial lockages, including several pleasure craft of light tonnage; in May there were 143 commercial lockages, and in June, 145. The accompanying diagrams (plates Nos. 73, 75, and 77) give in compact form the data month by month concerning the number of lockages, both commercial and noncommercial, the consumption of water from Gatun Lake due to lockages, and all other causes, etc.

FIRST SOUTHBOUND LOCKAGE FROM ATLANTIC TO PACIFIC.

The steamship *Ancon* was selected to pass through the canal upon the opening, carrying a large number of older canal employees and invited guests. She entered Gatun Locks at 8.06 a. m. and passed into Gatun Lake at 9.15 a. m. After passing through Gatun Lake and the "Cut," she arrived at Pedro Miguel at 12.51 p. m., leaving at 1.19 p. m. She entered upper Miraflores Locks at 1.55 p. m. and left the lower end at 3.23 p. m., passing into the Pacific.

The steamship *Arizonian* entered the lower lock at Gatun at 12.25 p. m., left the upper end at 2 p. m., the total time of lockage being 1 hour and 30 minutes. She arrived at Pedro Miguel at 2.32 p. m. on the following day, passing out into Miraflores Lake at 3.06 p. m. She entered Miraflores Locks at 4.05 p. m., and passed out into the Pacific at 5.40 p. m.

FIRST COMMERCIAL LOCKAGE FROM THE PACIFIC TO THE ATLANTIC.

The first commercial lockage going north occurred on August 16, 1914, when the steamship *Pleiades* of the Luckenbach Steamship Co. entered the lower chamber of Miraflores Locks at 7.15 a. m. She passed through to Miraflores Lake at 8.10 a. m., and entered Pedro Miguel Lock at 8.36 a. m., leaving for Gatun at 9 a. m. She arrived at Gatun at 3.39 p. m., leaving the Atlantic side of Gatun Locks at 4.47 p. m.

Further details of operation and maintenance of the locks are contained in the following extracts from reports of the lock superintendents.

Gatun Locks.

Capt. T. H. Dillon, superintendent.

PROCEDURE FOLLOWED DURING LOCKAGES.

Information is generally received from the captain of the port at Cristobal or from some station along the canal line from which probable time of vessel's arrival at Gatun Locks may be derived.

When everything is in readiness for a lockage the arrow signal at end of approach wall is set to enter.

A small boat with lock pilot aboard meets vessel some distance from end of approach wall, unless ship ties up at approach wall before the lock pilot returns from the previous lockage. Small boats with linesmen aboard and linesmen on the approach wall stand by to receive lines from ship and assist vessel to tie up along approach wall if necessary. In general the vessel comes in close alongside center approach wall and moves toward lock chamber under own power. Light manila heaving lines are cast from shore by which cables from locomotives are pulled aboard by ship's winches or linesmen. As a general rule four locomotives are used on ships of less than 300 feet. It is expected to use eight locomotives on battleships or ships of exceptional size. As soon as cables from bow locomotives are aboard and made fast a strain is placed on these lines at signal from the lock pilot and ship is drawn away from approach wall and forward toward lock chamber, and at the same time cables from other locomotives are taken aboard. The use of a small boat is necessary to get cables aboard from locomotives on side walls. When time is available the water level is equalized before arrival of ship and gates are opened, but fender chain is left up until ship is under control of locomotives. Ship's engines are stopped before bow of vessel passes fender chain.

The man in charge of lockage representing the lock force carries a portable phone which can be connected with the control house at any lamp-post on lock walls. He notifies control house when to lower fender chain and when to close the gates. The proper time for opening gates is indicated to control-house operators by the indicators on control board. All gates are under observation from the control house and cracking of gates caused by overtravel of water may generally be observed. Attempt is made to open gates just as soon as they crack so that reverse head assists the operation.

From time locomotive cables are aboard every movement of locomotives is made in response to standardized signals from lock pilot. Locomotives have a towing speed of 2 miles per hour. They slacken cables before ascending or descending inclines. During the course of the lockages the ship's engines are used only to assist locomotives in starting and stopping the ship. The breast locomotives assist the bow locomotives in starting the ship and then drop back during the tow and assist stern locomotives in stopping the ship. On up lockages manila ship cables are attached to snubbing buttons on lock walls to assist locomotives to steady ship in lock chamber during filling. When ready for the water the lock pilot signals the man in charge of lockage who phones the control-house operator. On down lockages manila cables are held in readiness but are not attached to snubbing posts because locomotives can easily hold ship steady in lock chamber. After water in last chamber is equalized with sea level or lake level, as the case may be, and gates are opened, the locomotives are used only to steady ship in chamber until propeller is started. after which locomotive cables are cast off and the ship leaves the locks under its own power. With strong beam winds and ships well out of the water the locomotives are used to steady the ship until stern clears the last gates.

On up lockages a pilot boat is used to pick up the lock pilot after the vessel leaves the lock chamber. On down lockages a counterweighted gangplank running on wheels is used and pilot comes ashore on center wall just before locomotives' lines are cast off.

Tunnel operators with silver helpers follow the course of the lockage and stand by during operation of each machine.

The fender chains for protection of gates are lowered as soon as gates are opened and raised as soon as gates are closed, with the exception of first noted above.

Tandem lockages, that is, two ships in same chamber at same time are frequently made where length of each ship is not more than 300 feet. To date the number of tandem lockages has been limited by the number of locomotives available rather than by length of lock chambers. A tandem lockage generally takes about 10 minutes more time than a single lockage.

Parallel lockages, being the simultaneous use of both east and west chambers at the same time, are made only in emergencies to avoid undue delay to vessels.

A complete operating crew for a single lockage consists of the following: One lock pilot; 1 supervisor, or general foreman in charge, generally on center wall; 1 general foreman or general operator in charge of lines on side wall; 1 general operator in charge of locomotives and instructor of locomotive operators; 1 control-house operator and a silver telephone operator; 6 locomotive operators; 2 silver helpers with each locomotive to handle cables; 2 tunnel operators in center wall tunnel, 2 tunnel operators in side wall tunnel; 2 silver helpers with each tunnel operator; 1 lockman, silver, in charge of lines on each wall; 4 silver employees to handle each manila cable and have in readiness to make fast to snubbing posts on lock walls. Each bow locomotive is preceded by a track walker to see that track is clear. The receiving force consists of 1 lockman, in charge; 1 boatswain with two small skiffs; 2 oarsmen each; 6 linesmen on center wall and 2 linesmen on side walls. The monthly labor cost for this operating crew is:

15 gold men	$2,375
52 silver men	1,885
Total	4,260

The lock pilot is carried on the rolls of the marine division. A tandem lockage requires the services of 1 additional lock pilot and 2 additional locomotive operators with their silver helpers. Parallel lockages require two complete operating shifts.

With trained lock pilots, no special difficulty is experienced during night operations and no appreciable time is lost. The lighting system on lock walls is very satisfactory. For night work the lock pilots carry two electric flash lights for giving signals. No locomotive operators are used for night work except those fully qualified.

The intermediate chambers are seldom used as no time is saved at Gatun and to date no economy in water consumption has been necessary.

Lockages have been made at less than regular lockage intervals, that is, with one ship in first lock while another ship was still in third lock. In this manner ships may follow each other through the locks at about one-half hour intervals. Small tugs and launches that can pass under the locomotive cables can be locked down while two or more ships are coming up, or vice versa; also tugs and barges of light draft may be locked through in two lifts by combining middle and lower locks, but no appreciable time is saved thereby on account of arrangement of interlocking system.

The lock pilots must be capable and experienced men in handling ships and must also be familiar with the operation of towing locomotives. The official in charge of the lockage from the lock force supervises the operation of his force and machinery from the lock walls and sees that the signals of the lock pilot are promptly and correctly obeyed.

Once in locks and under control of locomotives ships are handled easily and safely. As before stated, ships' engines are used in starting and stopping to relieve locomotives of part of strain and to save time. A few cases of errors or slowness by ship's engine-room force in obeying signals have occurred which have demonstrated the utility of having the separate towing system by towing locomotives. In all cases the locomotives have been able to stop the ship before it reached the fender chains or the gates. The value of being able to call on ship's power in starting and stopping and in case of broken cables has also been demonstrated.

Several instances have occurred where vessels have had difficulty in tying up to approach walls. At upper entrance this trouble has generally come from high winds, especially with ships that do not handle easily. No appreciable difficulty occurs due to opening of valves for filling upper chamber. Float observations in lake near end of approach wall indicate that there is a slight current toward spillway when spillway gates are open.

At the lower entrance difficulty in entering or tying up is encountered principally on account of spilling or on account of current caused by meeting of fresh and salt water when gates are opened. Difficulty here also is principally observed in ships that do not handle easily either through lack of power or slow response to engine-room signals. To facilitate arrival of ships at lower entrance the gates are left open all night or one gate is opened at 6 a. m., so that currents may die out before arrival of first ship. At other times, providing time is available, spilling is completed and gates are opened before vessel reaches one-half mile point or these operations are delayed until vessel is made fast.

GENERAL MAINTENANCE.

In addition to work of construction and special repair work already mentioned, general maintenance has been carried on, including inspection, cleaning, and lubrication of all machinery. A large amount of general work has been accomplished by the carpenters and masons, painters, machinists, blacksmiths, pipe fitters, and utility gang. The locomotive cranes have been kept in service and have been used for handling our work and passing material across locks for other departments.

TRAINING OF PERSONNEL.

While most of the employees have had considerable experience as mechanics or electricians they must be broken in for operations on the machines. It is necessary under present conditions to call on the men for work in practically any position, so that effort is being made to qualify all as locomotive operators, tunnel operators, and on emergency dams. Extra men must also be broken in as control-house operators. General foreman and general operators must be ready in emergencies to take charge of lines or lockages. All locomotive operators are trained by one man so that the same system is followed throughout.

The length of time required to qualify a locomotive operator who has had considerable experience electrically or mechanically varies from one to three weeks, depending on circumstances.

Pacific Locks.

F. C. Clark, Superintendent.

OPERATION.

The operating crews have acquired a high degree of proficiency, and the time of lockage has been materially reduced and is now at a minimum, averaging in the neighborhood of 25 minutes at Pedro Miguel and about 45 minutes at Miraflores.

At about the time two-shift operation was started, use of the 600-foot chamber was commenced for ships of 400 feet in length and under, principally for the purpose of assisting the regulation of Miraflores Lake and for the saving of time.

Delays to traffic due to failures of lock equipment during the year have been of negligible magnitude. But two cases have occurred due to failure of the machinery. One was due to a motor burning out, the delay amounting to about one-half hour; and the other due to the breakage of a locomotive line in one of the trial lockages. Delays due to failures on the part of the operators have in all amounted to less than an hour.

Studies of the surges and currents of the locks have been continued, and the results so far as possible applied to facilitate regular operation. Surging due to the drawing of water from Gaillard Cut is apparent. The period of the surge is such that with successive lockages the amplitude has reached a value of 2.42 feet. Owing to the currents produced by these surges, the locks are operated so that after 11 a. m., while the Cut is being dragged, water is drawn at half speed. During the actual passage of ships through the slide no water is drawn at all. The attached hydrograph (plate No. 76) made at the Pedro Miguel station on March 16 is of interest in this connection.

During the year 1,260 operations were made at Pedro Miguel, 1,085 of which were for commercial vessels. At Miraflores there were 1,236 operations, 1,085 of which were for commercial vessels. The increase in the average day's work by months is shown on the accompanying charts (plates Nos. 73 and 74).

Utilizing the short chamber and the ability to cross fill, in addition to locking ships down with the same chamber of water by which ships had been locked up, has resulted in a material reduction in the quantity of water required per lockage. For comparison the figures are:

	Per lockage.	
	Pedro Miguel.	Miraflores.
	Cubic feet.	*Cubic feet.*
September, 1914	3,650,000	3,370,000
June, 1915	2,900,000	3,270,000

The comparison of these two months shows a reduction of approximately 20 per cent for Pedro Miguel and 5 per cent for Miraflores.

MAINTENANCE.

A number of slight improvements and additions to the equipment have been made to minimize time and labor required in maintenance and to increase the safety of the men, such as adding handholds to the locomotives, installing liners in the swivel guides, placing cabinets to contain operators' tools and a small supply of lubricants in the tunnels, equipping the rising stem contactor panels with antirebounding devices, placing guides for towing locomotive cables on the lock walls, installing band brakes on the gate-hoisting machines of the emergency dams, and installing cable guides on the girder-hoisting machines.

In addition to the work of the above nature, there has been a considerable amount of labor expended in cleaning machinery, switchboards, floors, and copings, inspecting and lubricating the machinery, sounding and inspecting the interior of the miter gates, greasing miter and quoin post faces to preserve against corrosion, cleaning drift out of the forebays, adjusting and checking adjustments of the equipment, making lamp renewals, etc.

It was also necessary to level and line up the quadrants of the emergency dams on account of settlement of the foundation. The present indications are that settlement has about ceased and that one more adjustment on each of the four quadrants will give a permanent condition.

BACK FILL.

The work of grading the back fill at Pedro Miguel was commenced in October, 1914, when the grass and high weeds were cut down. All scrap was then removed and the water-pipe line on the east side lowered. By the latter part of March considerable work had been done on both the east and west back fill and the spaces in the concrete in all three walls had been graded and planted with grass. In order to complete this work before the rainy season set in, the force was increased in the early part of April. All the grading work was practically completed by the latter part of that month and was finished in May.

The work of grading the back fill at Miraflores was commenced in October, 1914, also by cutting grass and weeds and removing rubbish. The work of grading was started in November, and by the end of January practically all the spaces in the lock walls had been graded and planted in grass. The force was increased considerably in May, and the work was practically completed by the latter part of that month. The only part of the back fill remaining to be graded is the lower level on the east side and the slope between the upper and lower locks on the west side.

In the course of grading, the permanent tracks and sidewalks required have been laid and the necessary switches installed. Construction tracks have been removed and serviceable material returned to the store.

OPERATION OF FLOATING CAISSON.

Floating caisson No. 1 arrived from San Francisco October 29, 1914, and was installed at Miraflores Locks for test purposes. It was given a complete test, and some faulty electrical connections and defects were corrected.

The caisson was then used for unwatering the east chamber at Miraflores for the purpose of cleaning and painting the miter gates and the rising stem valves. This work on the east side was completed in March, and the caisson was then installed on the west side, where the same work was done on the miter gates and rising stem valves as on the east side.

At the time Miraflores Locks were unwatered a thorough inspection of the conditions of fixed irons, valves, and equipment in the culverts was made. This inspection revealed the fact that a galvanic action had taken place in the salt water between metals of different kinds. Tests have been made on preservative coatings having insulating properties, and it appears that this action can be eliminated.

The greatest action is apparent on the side seal strips of the rising stem valves. These strips are of relatively small dimensions and are so constructed as to be easily removed and replaced. At this time 10 of the rising stem valves were coated with bitumastic enamel. The cylindrical valve leathers and seats were scraped and missing and broken bolts replaced and a large amount of débris removed from the chambers and culverts. The caisson itself was painted in its entirety.

ELECTRICAL DIVISION.

The duties of the electrical division have been increased during the year by the transfer of the remaining construction work on transmission lines and substations from the division of erection when the latter division was abolished on July 15, 1914; the transfer of the electrical construction work connected with the new Panama waterworks from the municipal division on the same date; the transfer of all construction, operation, and maintenance work in connection with the telephone and telegraph systems and the railway signal system from the Panama Railroad on April 1, 1915, and the transfer of all work in connection with fire-alarm systems from the police and fire division on the same date.

The hydroelectric station at Gatun was placed in operation on July 13, 1914, and has been operating continuously without mishap or incident worthy of mention since that date. The four main substations of the transmission system were placed in operation in the early part of December, 1914, and the entire 44,000-volt transmission line on January 2, 1915. The operation of the transmission system as a whole has been generally satisfactory up to date. With the putting into service of the hydroelectric station, the operation of Gatun steam station was discontinued, and when the completion of the transmission line enabled the load at the south end of the canal to be transferred to Gatun, Miraflores steam plant was placed on a stand-by status, and has been operated as a reserve plant since January 2, 1915.

The rapid growth of the electrical demand on the Isthmus, together with the construction of plants of various kinds with electrical power apparatus that were not foreseen and considered at the time the plans for the hydroelectric station were adopted in the spring of 1911, has rendered it advisable to take up the question of an increase in the capacity of the hydroelectric station at an early date. The station is sufficient for present needs, but heavy additional demands will be made within the next few months for dry-dock pumps, air compressors, coaling plants, cold storage plant, and other miscellaneous purposes. These additional loads could be taken care of by Miraflores steam station, but only at an increased cost for generating the power required of at least three-quarters of a cent per kilowatt hour. While the aggregate increased cost can not be accurately estimated on account of the uncertainties as to the future load conditions, it would unquestionably be of sufficient amount to justify considerable expenditures in increasing the capacity of the hydroelectric station.

The electrical engineer is now investigating the matter, and reports that consultation with the manufacturers of the present generators and turbines indicates a strong possibility of being able to secure an increase of approximately 40 per cent over the present capacity of the station by changing the turbine runners and making corresponding changes in certain other elements of the generating and transmission system. He estimates the cost of the necessary changes in the hydroelectric station alone at $22,500 and of the other changes for additional cables and transformers at $50,000. It appears at the present time that this work can be done within the appropriation allotments for the fiscal year 1916. From present indications it is thought that these changes will be advisable, but the matter will be made the subject of further report when the details have been worked out.

The average production cost of current at the hydroelectric station during the last six months of the fiscal year was .09 cents per kilowatt hour, and the average cost delivered from all substations was .65 cents per kilowatt hour. These costs do not include the charge for functional depreciation of 3 per cent of the capital cost of the entire power system. Including this depreciation the costs were

.44 cents and .99 cents per kilowatt hour, respectively. The production cost of current at Miraflores steam station during the first six months of the fiscal year was .97 cents per kilowatt hour.

Marked erosion of the baffle piers at Gatun spillway has taken place during the last rainy season and extensive repairs are contemplated during the coming dry season.

Work is in progress at the close of the fiscal year on the removal of the temporary portion of Miraflores steam station building and its replacement by permanent concrete construction.

The Empire steam power plant was shut down permanently on September 17, 1914, and the Balboa plant on May 23, 1915. The operation of the Empire air-compressor plant was discontinued on the same date as the power plant. The Balboa air-compressor plant has continued to operate throughout the year for the supply of air to Balboa shops and the terminal construction work in the Balboa district.

Two small substations, one at Gamboa of 1,332 KVA transformer capacity for the supply of power to the pumping and gravel handling plants at that place, and one at Darien of 532 KVA transformer capacity for the naval radio station were constructed and placed in operation during the year.

The operation of the 13 electric cargo-handling cranes of the Panama Railroad on Balboa pier was conducted throughout the year by the electrical division. The construction, operation, and maintenance of telephone, telegraph, and railway signal systems for the Panama Railroad was conducted after April 1, 1915. The telephone and telegraph system on the Isthmus was entirely reconstructed during the fiscal year. The shifting of the major portion of the telephone load from the Empire-Culebra district to Balboa necessitated a rearrangement of central offices, and the completion of the trans-isthmian 4-duct conduit line and installation therein of a 50-pair, duplex, loaded, lead-sheathed telephone and telegraph cable enabled about 2,000 miles of overhead telephone, telegraph, and signal wire to be removed. The automatic block signal system of the Panama Railroad which has been under construction for the past three years was completed during the fiscal year.

The usual operation and maintenance work in connection with electrical overhead and underground distribution systems, house and street lighting systems, throughout the Canal Zone, and installation, maintenance, and repair of electrical apparatus for all departments and divisions was done by the electrical division. An electrical repair shop was organized and equipped during the year, and over 300 repair jobs of various magnitudes completed.

A large amount of electrical construction work was done throughout the year in addition to that already mentioned. The light and power installations in the new Balboa shops was advanced from 80 per cent of completion to completion, and the Mount Hope dry-dock shop was electrified and a 2,500-cubic-foot motor-driven air compressor installed. Two 500-kilowatt rotary converters were installed, one at Gamboa and one at Balboa Dock. Three installations of large motor-driven relay pumps were made for the dredging division and a floating pump barge was equipped for service at the locks. Work was done for the Navy Department in the electrical installations at the three radio stations. A new system was installed on Balboa Dock and the electrical equipment at the four Miraflores berm cranes dismantled, thoroughly overhauled, and its reinstallation as part of the new Balboa coaling-plant equipment begun. New series incandescent street-lighting systems were designed for towns of Ancon-Balboa, Pedro Miguel, Gatun, and Cristobal, the material purchased and the installation carried to 90 per cent of completion. Underground conduit systems for the distribution of electric light and power and for telephone, telegraph, and fire-alarm service were constructed in the Ancon-Balboa district and in the towns of Pedro Miguel, Gatun, and Cristobal-Colon, and the necessary cables, transformers, etc., installed. A small amount of work still remains to be done on the underground distribution systems, but as a whole the work is over 90 per cent complete. The active building operations during the past year on permanent quarters and other buildings for The Panama Canal, the Army, and the Navy Department has involved considerable work for the electrical division in the preparation of designs and specifications and the installation of lighting systems, etc., the details of which are covered in the report of the electrical engineer, which follows:

Electrical Division.

Capt. W. H. Rose, Electrical Engineer.

At the beginning of the fiscal year the duties of the electrical division comprised the operation and maintenance of all power plants, air-compressor plants, electrical transmission and distribution systems, and electric cargo-handling cranes; the design, construction, operation, and maintenance of the permanent underground electrical distribution systems for The Panama Canal and of all street and building lighting systems; the installation, operation, maintenance, and repair of electrical apparatus of all kinds for other departments and divisions of The Panama Canal.

During the fiscal year the duties of the electrical division have been increased by the assignment to it of the following work:

On July 15, 1914, the division of erection was abolished and the remaining electrical work on the permanent substations and the 44,000-volt transisthmian transmission line was assigned to the electrical division.

On July 15, 1914, the electrical work in connection with the installation of the new pumping and filtration plants of the municipal division was transferred from that division to the electrical division.

On April 1, 1915, all construction, operation, and maintenance work in connection with telephone and telegraph systems and railway signal systems was transferred from the Panama Railroad to the electrical division, and on the same date the work on the fire-alarm systems was transferred to this division from the police and fire division.

DIVISION OFFICE AND DESIGNING WORK.

The usual office work was done throughout the year in connection with miscellaneous correspondence, reports, power and compressed-air accounting, and other routine papers. Plans were developed and specifications prepared for underground conduit distribution systems for electric light, power, telephone, and fire-alarm service in all permanent towns of the Canal Zone; for modern series incandescent street-lighting systems in the permanent towns and army posts; for lighting and power systems in all new buildings for The Panama Canal, United States Army, and United States Navy, for light and power systems on new Pier No. 7 of the Panama Railroad at Cristobal and for the Panama Railroad dock at Balboa; for an underground and submarine 6,600-volt transmission line from Gatun hydroelectric station to Fort Sherman at Toro Point; and, in cooperation with the division of terminal construction, for the electrical equipment in connection with the pumps, capstans, light and power distribution, etc., of the new dry dock at Balboa.

OPERATION OF POWER PLANTS.

Hydroelectric station.—The hydroelectric station at Gatun, which had been turned over to this division in a partially completed condition on June 18, 1914, was put into regular operation on July 13, 1914, since which date it has been in continuous operation. The Gatun steam plant was shut down on the same date and has not since then been operated for the generation of power.

The first year's operation of this plant has been highly satisfactory so far as the operating characteristics of all machines and apparatus are concerned. With the exception of brief peak loads on a few occasions the hydroelectric station has carried the entire electrical load of The Panama Canal without assistance from the steam station at Miraflores since January 2, 1915, the date of putting into service the section of the transmission line between Gatun and Miraflores. A duplicate exciter bus and duplicate Tirrell voltage regulator have been installed during the past fiscal year. A fairly large proportion—about 30 per cent—of the present load is due to motor-driven relay pumps of the dredging division, operated in connection with their dredging work at Balboa terminals, Cucaracha slide, and the east breakwater at Colon Harbor. This portion of the load must be considered as only temporary, but from present indications it does not appear that there will be any substantial reduction in its amount for at least a year.

It has become obvious from studies of present and prospective load conditions that notwithstanding the reduction in power demand that will eventually occur, due to the shutdown of the relay pumps and to the discontinuance of other temporary loads of lesser magnitude, the present generating equipment in the hydroelectric station will be inadequate to meet the demand for power within a very few months, due to heavy increases in load that are in immediate prospect.

The principal increases that are to be expected are as follows:

(1) Balboa shops motor-driven air compressors, connected load approximately 1,500 horsepower, peak load 1,500 horsepower, probable load factor 60 per cent.

(2) Balboa cold-storage plant, ammonia compressors, and miscellaneous light and power, connected load approximately 500 horsepower, peak load 460 horsepower, probable load factor 80 per cent.

(3) Balboa coal-handling plant, connected load approximately 1,300 horsepower, peak load 1,000 horsepower, probable load factor impossible of prediction.

(4) Cristobal coal-handling plant, connected load approximately 4,100 horsepower, peak load 3,000 horsepower, probable load factor impossible of prediction.

(5) Dry-dock pumps, capstans, and miscellaneous light and power, connected load approximately 5,000 horsepower, peak load 4,500 horsepower, probable load factor uncertain but very low.

(6) Charging sets for United States Navy submarines, connected load approximately 1,300 horsepower, peak load 1,000 horsepower, probable load factor uncertain but very low.

(7) Miscellaneous light and power at Forts Randolph, Sherman, and Grant, connected load approximately 200 horsepower, peak load 150 horsepower, probable load factor 30 per cent.

In the above summary of future loads the load factor is based on the ratio of 24-hour average load to connected load.

The present load on the hydroelectric station, exclusive of relay pumps and other temporary demands, averages about 3,500 kilowatts on week days, with a 2-hour peak of slightly over 4,000 kilowatts, 5-minute peaks of over 4,500 kilowatts, and a load factor of about 90 per cent based on ratio of average load to 2-hour peak load. The power factor at the station averages about 80 per cent. At this power factor the three turbo-generator sets at the hydroelectric station have a combined rating of 6,000 kilowatts, and their output is limited to about 6,600 kilowatts by the capacity of the waterwheels.

It will be seen that the first two items alone of the prospective increases as listed above, will demand practically all of the present surplus at the hydroelectric station, when transmission and transformation losses are considered. It is therefore obvious that a substantial increase in the capacity of the station must be made at an early date unless recourse is had to the comparatively wasteful method of generating power by the steam station at Miraflores. The increased cost involved in this would amount to at least three-quarters of a cent per kilowatt hour. The aggregate increased expense due to steam generation can not be predicted on account of the uncertainty as to the power demand of the large coaling plants. The connected load in these plants is extremely large and while the load factor will probably be low when the plants are first put into service, the power demand even at this time will be heavy, and will constantly increase. I think it is certain, considering all additional loads that are still to come upon our power system, that the increased cost of steam generation would certainly aggregate $50,000 per annum and might aggregate double that amount.

The decision as to the number and size of the generating units as at present installed in the hydroelectric station was made in May, 1911, and was based on studies made prior to that date of probable power demands so far as they could be foreseen at the time. These studies were probably as accurate as could be made at a period over four years ago, considering the undeveloped stage of the plans for shops, dry docks, coaling plants, waterworks, military posts, etc., at that time. Since then conditions have arisen that have called for the addition of very heavy power loads that were not considered at all in these early studies. Among these may be mentioned the new Panama waterworks system, the electrification of the Mount Hope Dry Dock shops, the Balboa coaling plant, the Balboa cold-storage plant, and the storage-battery charging sets for the United States Navy submarines.

The net result of these early studies was to show a probable day load of about 4,000 kilowatts, assuming that the Panama Railroad would not be electrified and that electric current would not be generally used for domestic purposes, such as cooking, assuming the railroad electrification, and the general domestic use of current, the probable day load was computed as approximately 5,000 kilowatts with a 1-hour peak of 5,700 kilowatts. It will be seen that on these assumptions the installation of generating equipment of 6,000 kilowatts capacity allowed a reserve for future growth of about 1,000 kilowatts, since the 1-hour peak could be carried as an overload and therefore disregarded so far as the capacities of the generators were concerned.

Later developments have not led to the electrification of the Panama Railroad, and there does not appear to be any immediate prospects of economic conditions justifying such electrification. There is a very considerable demand for domestic purposes—although no general installation of electric cooking appliances has been made, such as was apparently contemplated in the studies. Unexpected increases, however, in such loads as were contemplated, together with the addition of loads that were never contemplated at all, some of which have been mentioned above, make it apparent that the reserve allowed for was insufficient and that in the interest of economy the capacity of the hydroelectric station should be increased.

That such increase was bound, in time, to be required, was taken into account in the design and construction of the present station, and openings have been left in the forebay wall for the installation of three additional penstocks with the necessary head-gate apparatus, and the electrical apparatus in the station proper has been arranged on a unit system so that additional units can be installed with the minimum of trouble and expense. Notwithstanding these arrangements, however, an increase in capacity in this station effected by installing additional units will involve a heavy expense. The total cost of the present station was approximately $650,000, of which $340,000 was for building construction. Considering present conditions as to prices of electrical equipment in the States and the labor situation on the Isthmus, it is doubtful if the station could be duplicated at the present time for less than the amount given above. It would be unwise to make any addition to the present building without extending it so as to provide for three more units—a duplication of the present plant. This extension would cost as much as the original building.

I believe that the necessity for this extensive construction work can be postponed for several years at least by a comparatively inexpensive change in the present plant that will increase its capacity by approximately 40 per cent. As stated previously, the present generating units are limited to 2,200 kilowatts output at 80 per cent power factor by the capacity of the water turbines, which are rated at 3,000 horsepower. The generators, on the other hand, are very liberally rated and the manufacturers state can be operated without injurious rise in temperature at 3,000 kilowatts at 80 per cent power factor, or 3,600 kilowatts at 90 per cent power factor. The turbine manufacturer states that by changing the runners, the lower ring covers, and liner plates, at an approximate cost of $12,600 for material alone for all three units, the capacity of the turbines can be increased to 4,400 horsepower each, which corresponds to approximately 3,100 kilowatts from the generators. This would increase the capacity of each unit by 900 kilowatts, and of the station by 2,700 kilowatts, an increase of approximately 40 per cent over its present capacity. Necessary changes in switches, instruments, etc., and the cost of labor involved in the installation of the new equipment would raise the total cost of the changes to approximately $22,500. In order to make the increased capacity of the generating station available at the substations, additional cable feeders would have to be installed between the hydroelectric station and Gatun substation at an estimated cost of $25,000 for material and labor, and additional transformer and oil switch equipment would have to be installed in Gatun and Cristobal substations at an estimated cost of $25,000 for material and labor. The additional cables and substation equipment would be required no matter what method were adopted for increasing the capacity of the hydroelectric station. None of this work would be lost in case later developments on the Isthmus rendered necessary the extension of the hydroelectric station and the installation of additional units. The work could be completed within a comparatively short time, say six months from the date of placing orders for the equipment, and can probably be done with funds available from appropriations for the fiscal year 1916. Investigations made to date appear to indicate the advisability of making these changes, although the matter is still under consideration and will be made the subject of further report and recommendation upon the completion of the investigations now in progress.

The production cost of current delivered from the switchboard of the hydroelectric station during the period from July 13, 1914, the date the station was first put into service, to June 30, 1915, was .17 cents per kilowatt hour. From July 13, 1914, to January 2, 1915, the station was operating on very light load on account of the transmission line not being in service, and costs were unduly high. From January 1 to June 30, 1915, during which period the station was operating under normal conditions, the cost was .09 cents per kilowatt hour. These costs include all operation, maintenance and division overhead charges, but do not include a charge of 3 per cent per annum of the capital cost of the entire power system that is being charged into our monthly accounts against the cost of power to cover functional depreciation. For convenience in accounting the depreciation of the entire system, including transmission line, substations, and distribution systems is charged into the cost of power at the generating station. If this depreciation charge is included, the cost of power at the hydroelectric station for the fiscal year was .59 cents per kilowatt hour, and for the last six months of the fiscal year .44 cents per kilowatt hour.

The operation and maintenance of Gatun spillway was conducted during the year by the power station employees without incident worthy of special mention. Considerable erosion of the baffle piers has taken place during the present rainy season, which will require extensive repairs during the next dry season. It is believed that future trouble can be eliminated by extending the area of the exposed surface that is protected by heavy cast-iron plates to include the two short sides of the piers, and protecting by steel angles the concrete floor in the angle formed by the vertical sides of the pier with the floor.

Miraflores steam station.—Miraflores steam station was operated on load from the beginning of the fiscal year until January 2, 1915, when the transmission line was put into service. Since that date it has been operated as a reserve plant, several boilers being kept under steam and up to pressure at all times so as to provide for a prompt resumption of service in case of failure of the transmission line. It has also on a few occasions assisted the hydroelectric station by carrying peak loads of 200 or 300 kilowatts for brief periods. One or two of the 1,500-KVA. turbo generators have been kept "floating" on the line at all times, so as to be in immediate readiness for service in case of emergencies, and also for power factor correction by operation as a synchronous condenser.

For the first six months of the fiscal year the production cost of current at the Miraflores station was .97 cents per kilowatt hour, of which .71 cents was for fuel. The average net output for the same period was 158 kilowatt hours per barrel of oil.

At the time the Miraflores station was constructed in the early part of the calendar year 1909 it was thought that when the new power system for the canal would be constructed the Miraflores substation building could be combined with the steam-station building for economy in construction and operation. The west end of the steam-station building was therefore constructed in a temporary manner of wood and galvanized iron instead of concrete, to permit the addition of a wing for the substation. The later developments in the substation plans when their details came to be worked out rendered this scheme of joint construction inadvisable. The advantages of economy in operation which it was hoped to gain have been brought about by removing the switchboard for generator and exciter control and the motor generator exciter sets from the steam station to the substation building. This work was done during the fiscal year 1915 at a total cost of $8,907.30 and enables a saving of $4,800 per annum to be made in switchboard operators' salaries.

The condition of the temporary wooden portion of the station building was rapidly growing worse due to decay of timbers, and it became advisable to undertake the completion of the building in concrete construction. The plans have been made in connection with this work for extending the building by about 30 feet, so that the remaining boilers and generating units in the Gatun steam plant can be transferred to Miraflores. This will result in better and more economical maintenance of the equipment, will improve the arrangement of the power system as a whole from the operating standpoint, and enable the old Gatun steam plant to be entirely dispensed with. This work is now under way and was approximately 40 per cent completed at the end of the fiscal year.

Empire steam station.—The Empire steam station was operated until September 17, 1914, for the supply of light and power to the towns of Las Cascadas, Empire, and Culebra. On that date the load was transferred to the Miraflores plant and the Empire plant permanently shut down.

Balboa steam station.—The Balboa steam power plant was operated until May 23, 1915, for the supply of 220-volt direct current to the five Shaw cranes on the Panama Railroad dock at Balboa. On the above date a rotary converter on the dock was put into service and the Balboa power plant permanently shut down.

Power output.—The following tabulation shows monthly power outputs from all generating stations during the fiscal year:

Date.	Steam power plants.				Hydroelectric.
	Gatun.	Miraflores.	Empire.	Balboa.	
1914.					
July	257,650	1,898,580	89,980	7,157	371,400
August	....	2,253,140	81,840	4,364	638,430
September	....	2,124,280	34,690	2,876	635,950
October	....	2,035,360	....	4,007	674,700
November	....	1,811,620	....	3,563	619,200
December	....	1,984,795	....	3,839	788,010
1915.					
January	....	83,110	....	2,228	3,143,630
February	....	85,050	....	2,256	2,785,830
March	....	20,350	....	3,039	2,606,620
April	....	31,980	....	2,405	2,249,700
May	....	45,690	....	828	2,367,000
June	....	1,740	....	....	2,464,280

OPERATION OF AIR-COMPRESSOR PLANTS.

The Empire air-compressor plant was operated until September 17, 1914, for the supply of compressed air for drills, etc., in the excavation work in the Culebra district. The status of this work enabled the plant to be permanently shut down on the above date.

The Balboa air-compressor plant was operated throughout the fiscal year for the supply of compressed air for Balboa shops, dry dock, and terminal construction, Sosa Hill quarry, and other purposes.

The following tabulation shows the monthly outputs of each plant in cubic feet of free air compressed to 105 pounds gauge pressure:

Date.	Balboa.	Empire.
1914.		
July	327,549,979	58,989,390
August	340,112,864	39,683,435
September	280,190,655	9,824,610
October	290,254,403	....
November	229,034,275	....
December	272,340,755	....
1915.		
January	207,096,712	....
February	129,438,628	....
March	172,927,179	....
April	151,016,072	....
May	120,760,010	....
June	151,915,500	....

OPERATION OF SUBSTATIONS AND TRANSMISSION LINES.

At the time the substations were turned over to the electrical division, on July 15, 1914, the status of the electrical construction work on each of the four main substations was approximately as follows:

	Per cent completed.
Cristobal	8
Gatun	57
Miraflores	32
Balboa	8

Part of the equipment in the Gatun substation was placed in service in October. Both Gatun and Cristobal substations were placed in complete service on December 5, 1914, and Balboa and Miraflores substations on December 3, 1914, together with the sections of transmission line between Gatun and Cristobal, and between Miraflores and Balboa.

The transmission-line construction was approximately 95 per cent completed on July 15, 1914. Sections of it were placed in service on the dates mentioned above. The section between Gatun and Miraflores could not be energized until January 2, 1915, on account of interference with the overhead telephone and telegraph wires of the Panama Railroad which were not put out of service until that date.

A substation at Gamboa for the new pumping station of the municipal division, the sand and gravel handling plant of the dredging division and for local lighting service was constructed during the fiscal year and placed in service during February, 1915. This substation contains two transformers of 666 KVA. capacity each, with the necessary oil switches, lightning arresters, etc. Its cost was $23,775.03.

A substation at Darien for the high-power naval radio station at that place was constructed during the year and placed in operation in March, 1915. It contains two 266 KVA. transformers and auxiliaries. Its cost was $12,772.08, exclusive of building. The cost of the building can not be given as it was not segregated from other building work performed for the Navy Department at the Darien radio station.

All towers of the transisthmian transmission line were repainted during the year at a total cost of $9,699.12. Five thousand eight hundred cubic yards of hand excavation, mostly rock, were done during the year in order to give at least 10 feet clearance from transmission-line wires to ground at all points along the Panama Railroad. In some of the narrow cuts the clearance was dangerously low prior to this work. The total cost was $6,615.41.

The operation of all substations was conducted from the time they were placed in operation without material difficulties and without incident worthy of mention. There have been no interruptions of high-tension service due to failures of substation equipment.

The first few months' operation of the transmission line developed the usual trouble with insulators, on account of heavy driving storms at the beginning of the rainy season that showed up defective insulators that had not failed under the initial tests of the completed line during exceptionally fine, dry season weather. With the removal of the defective insulators the trouble has been largely eliminated, although occasional failures still occur. Since January 2, 1915, when the entire 47 miles of transmission line were first put into service there have been 17 interruptions of high-tension service, due to the following causes:

Insulator failures	8
Falling tree	1
Dredge *Chame*	1
Broken ground wire	1
Painter's rope causing short circuit	1
Monkey on line	1
Short circuit on secondary feeder	1
Cause unknown	3
Total	17

Considerable trouble was experienced at first with the ground wire breaking. Up to the time the work was transferred to the electrical division, the division of erection had a record of 23 breaks. From July 15, 1914, to June 30, 1915, the electrical division had a record of 13 additional breaks. Investigations made during the year developed that the copper-clad steel ground wire had been originally strung with too small a sag and too great tension. Additional sag was cut in throughout the whole length of both lines, and alternate ground wire clamp loosened up so as to allow a slight motion parallel to the line when the towers are set into vibration by passing trains. There has been only one break recorded in the last four months.

One transmission-line tower was carried out in a landslide and completely lost on August 12, 1914.

The average cost of power distributed from all substations during the fiscal year was 0.65 cent per kilowatt hour, exclusive of the 3 per cent depreciation charge on the capital cost of the entire system, and 0.99 cent per kilowatt hour including the depreciation charge.

OPERATION OF BALBOA CARGO-HANDLING CRANES.

The electrical division performed all work in connection with the operation and maintenance of the electric cargo-handling cranes of the Panama Railroad on Balboa Dock. Two hundred and nineteen vessels were loaded and 267 unloaded during the fiscal year. The total number of crane-hours worked was 26,666 and the total number of crane-hours delay was 65½.

All 13 cranes were painted during the year and the electrical equipment given a thorough overhauling.

A 300-kilowatt rotary converter, formerly installed in Miraflores power plant was moved to Balboa Dock and installed for the supply of direct current at 220 volts to the five Shaw cranes, allowing Balboa power plant to be permanently shut down.

OPERATION OF TELEPHONE AND TELEGRAPH SYSTEM.

On April 1, 1915, all work in connection with the construction, operation, and maintenance of the Panama Railroad telephone and telegraph system was transferred to the electrical division. Mr. W. H. Fenley, superintendent of telephones and signals, had been in immediate supervision of this work prior to the transfer. The following report covers operations for the entire fiscal year.

The construction of the underground transisthmian conduit line and the installation of the new 50-pair cable therein, which enabled the existing overhead lines to be removed, together with the shifting of the telephone load from the Empire-Culebra district to Balboa, necessitated an entire rehabilitation of the telephone system and a general rearrangement of the central offices.

In order to give temporary service during the period of moves and changes, the PBX boards at Empire, Empire shops, Gorgona shops, and a number of other points were abolished and centrals established at Balboa and Balboa shops. A new nine-position switchboard was installed in the administration building, Balboa Heights, and upon its completion the centrals at Ancon, Balboa, Balboa shops, Corozal, Ancon administration building, and Culebra were abolished and the entire telephone load for this territory concentrated on the Balboa Heights central office. In addition to this, centrals at Toro Point, Mount Hope, and Porto Bello were abolished, and PBX boards established at Coco Solo Point and Paraiso.

The four permanent central offices are located at Balboa Heights, Pedro Miguel, Gatun, and Cristobal with a secondary central at Empire and PBX boards at the Governor's office, Naos Island, Hotel Tivoli, Ancon Hospital, Paraiso, and Coco Solo. Trunk service is furnished for outside switchboards at Toro Point, Hotel Washington, Camp Otis, Darien radio station, Balboa radio station, Colon radio station, Gatun Locks, Pedro Miguel Locks, Miraflores Locks, and the United Fruit Co.'s office in Cristobal.

Construction work was in progress at the beginning of the fiscal year on the transisthmian underground conduit line for telephone and signal cables. The final plans called for an 8-way conduit between the Panama Railroad station and Mount Hope pumping station, 4-way from Mount Hope to Corozal, and 8-way from Corozal to Balboa. The total length of the line is approximately 46.5 miles, of which 3.9 miles are 8-way and the remainder 4-way. There are 777 manholes in the entire line.

At the beginning of the fiscal year 86,097 trench feet, about 16.3 miles, had been completed. The remaining work was completed on October 20, 1914, at an average rate of 3,260 conduit-feet per day. The average cost, including manholes, drainage, etc., was 75 cents per conduit foot. The total number of conduit feet, including all branches, is 258,505 feet, and there are a total of 1,120,842 duct-feet. A 50-pair duplex, paper insulated, lead sheathed telephone-telegraph cable was pulled into this duct line from the central office in Cristobal to Balboa Heights, a length of approximately 46 miles. This cable has submarine sections at Gamboa, Monte Lirio, and Mindi. It contains 12 pairs of 19-gauge conductors in pairs and 38 pairs quadded for phantom circuits. It is "loaded" with 43 cases of loading coils, and affords a good grade of commercial transmission with freedom from cross talk between all physical or phantom circuits. The average cost of pulling in the cable, including rodding of ducts but not including testing and splicing, was 1.4 cents per foot. The signal cable, which was nonleaded, was pulled in for 0.89 cents per foot. The telephone cable cost 40.8 cents per foot and the loading coils $975 per case.

On June 30, 1915, there were in service as component parts of the telephone system 439,501 feet of lead-sheathed telephone cable containing 23,547,850 circuit-feet of conductors; 825 miles of overhead wires (open construction); 1,377,613 conductor-feet of twisted pair and other types of aerial distribution. There were 1,609 telephones in service, an increase of 224 during the fiscal year. The actual telephone load is estimated to have increased 30 per cent since the transisthmian cable was placed in operation. The estimated value of the entire telephone plant is $371,500, including the value of one duct in the transisthmian duct line.

In addition to the work mentioned above, 3,211 poles, 1,780 miles of No. 10 hard-drawn copper wire, 205 miles of No. 10 copper-clad, weatherproof signal wire, and 7,420 cross arms were taken down as being of no further use. Approximately 175,000 feet of cable, ranging from 5 to 300 pairs, was installed in permanent townsites during the year, and 92 per cent of the total number of telephones were moved from one location to another. The electrical work in new Piers Nos. 8, 9, and 10, and in the Masonic Temple at Colon was done by the telephone organization. An annunciator system and a fire-alarm system was installed in the new administration building.

An 8-conductor cable was pulled into the transisthmian duct line for the Central & South American Telegraph Co. in a duct leased to that company. This cable extends from the Panama Railroad passenger station in Colon to a cable hut in East Balboa and is about 48 miles in length. About 42,000 feet of submarine and underground cable was installed for the same company in Panama Bay and Panama City.

For the Panaman Government the telephone department built a pole line from Panama to the south portal of Miraflores Tunnel and installed a 15-pair cable in the Panama Canal conduit line from the tunnel to Pedro Miguel Locks.

Underground conduit construction amounting to 18,475 conduit-feet and 135,398 duct-feet was installed for the fortification division at Margarita Island, Toro Point, Battery Morgan, Naos, Perico, and Flamenco Islands, and Fort Grant. Underground conduit work amounting to 9,620 conduit-feet and 64,730 duct-feet was installed by the telephone department before its transfer from the Panama Railroad for the electrical division of The Panama Canal.

OPERATION OF TELEGRAPH AND ELECTRIC CLOCK SYSTEMS.

This work was also transferred to the electrical division from the Panama Railroad on April 1, 1915. During the fiscal year 3 telegraph offices were opened and 17 closed, leaving 22 in service. Six electric clocks were removed and 4 installed, leaving 40 in service. The value of the telegraph and clock equipment in service, including 4/50 of the value of the transisthmian cable, is estimated at $26,715.

OPERATION OF RAILWAY SIGNAL SYSTEM AND ACCESSORIES.

The construction, operation, and maintenance of all railway signals was transferred from the Panama Railroad to the electrical division on April 1, 1915.

During the fiscal year train-order signals were installed at 4 locations and removed from 7 locations, leaving a total of 15 in service, with 12 power-operated arms and 34 mechanical arms. Five mechanical switch signals were removed and none installed, leaving 6 in service. Six derails were removed and 6 installed, leaving a total of 23 in service. Interlocking plants were installed at the swing bridge over the French canal near Mount Hope, Paraiso pontoon bridge, Summit, Diablo, and Balboa Heights. Plants were removed at Summit and Panama. The interlocking plants at Cristobal, Mount Hope, Pedro Miguel, and West Leg were changed and enlarged, due to track and traffic changes. There are 9 of these plants left as permanent equipment, handling 26 interlocked switches, 12 bridge locks, 34 derails, 24 power signals, and 31 mechanical signals, with a total of 168 active levers.

Automatic signals were installed from the south end of Miraflores Tunnel to Panama and interconnected with the mechanical plants at Diablo, Balboa Heights, and West Leg, using special circuits and electrical devices at the latter two points to increase the flexibility of train movements and permit movements against the current of traffic between these two points. This extension required the erection of 17 signals, 11 of which were placed on offset poles on account of the track-span bridges.

All aerial signal wires were abandoned and the underground signal cable in the transisthmian duct line placed in service on February 17, 1915. There was a total of 203,430 feet of signal cable, 9 and 13 conductor, installed in the transisthmian duct line during the fiscal year, at a total cost of $97,084 for material and labor. At the end of the fiscal year the automatic signal system proper included 100 bottom post and 10 top post signals. In addition to this there are 15 bottom post and 33 top post power operated and manually and semiautomatically controlled signals, or a total of 148 motor-operated signals. There are 14 cabin indicators, 70 switch indicators, 524 insulated joints, 134 switch boxes, 125 track sections, 2,810 primary cells, and 400 storage-battery cells used in connection with the automatic-signal system and the various interlocking plants. One hundred and twenty thousand feet of single conductor wire are installed to connect this apparatus to the signal cable. The total value of all interlocking plants is estimated at $38,150, and the value of the signal system, including its proportion of transisthmian duct line, is estimated at $272,100, making a total of $310,250 for interlocking plants and signals.

During the fiscal year there were two false clear-signal aspects. There was a total of 2,638,821 arm movements during the year and a total of 258 failures, giving 10,228 arm movements per failure.

NORTHERN AND SOUTHERN DISTRICTS.

The usual operation and maintenance work was done in the northern district during the year in connection with underground and overhead light and power distribution systems, house and street lighting systems, and maintenance of electrical equipment for other departments and divisions in the towns of Gatun, Mount Hope, Cristobal, Colon, and surrounding districts. Similar work in the southern district covered the towns of Gamboa, Las Cascadas, Empire, Culebra, Paraiso, Pedro Miguel, Corozal, Ancon, Balboa, La Boca, and surrounding territory. The 60-cycle distribution systems in the Colon-Cristobal district and in the Las Cascadas-Empire-Culebra district were torn out during the year and replaced by 25-cycle systems.

ARMATURE WINDING AND ELECTRICAL REPAIR SHOP.

All armature winding and electrical repair work for all departments and divisions of The Panama Canal has been assigned to the electrical division, and a small shop has been organized in building No. 9, Balboa shops, to take care of this work. The amount of work has gradually increased in volume during the year, and the shop force now consists of a foreman and four armature winders on the gold roll and two silver employees. A total of 309 repair jobs of various magnitudes was completed during the year, of which 88 involved the complete rewinding of motor armatures or stators.

GENERAL ELECTRICAL CONSTRUCTION WORK.

Substations and transmission lines.—The electrical installation in the four main substations at Cristobal, Gatun, Miraflores, and Balboa was approximately 25 per cent completed when their construction was assigned to this division on July 15, 1914. The transmission line was approximately 95 per cent completed, the principal work remaining being the installation of five special 84-foot towers, two at Mount Hope and three at Balboa. The steel for these towers had not yet arrived from the States.

All work on the four main substations and on transmission lines, including testing, was completed by December 5, 1914, on which date all substations were in service. The entire length of the transmission line was not put into service until January 2, 1915, on account of interference with overhead telephone and telegraph wires that were in service up to that date. In the months of January, February, and March two additional substations were built, one at Gamboa and one at Darien, as previously noted in this report.

The following are the construction costs of the principal elements of the transmission system:

Preliminary work	$36, 204. 22
Transmission line	1, 046, 267. 36
Gatun substation	314, 165. 48
Miraflores substation	336, 516. 44
Cristobal substation	289, 200. 93
Balboa substation	281, 198. 25
Gamboa substation	23, 775. 03
Hydro station, Gatun substation conduit line and cables	154, 947. 25

Balboa shops.—The electrical construction work in connection with the installation of power and lighting systems in the new Balboa shops was 80 per cent completed at the beginning of the fiscal year. A list of the various items included in this work was given in the last annual report. The work was completed during the present fiscal year, together with such extensions and alterations as became necessary during the progress of the work.

Electrification of Mount Hope dry-dock shops.—All electrical work in connection with the installation of a new 2,500-cubic-foot synchronous motor-driven air compressor and the complete conversion of the shops from steam to electric drive was done during the fiscal year.

Installation of rotary converters.—A 300-kilowatt synchronous converter was installed at Gamboa for the operation of the sand and gravel handling plant at that place, replacing a steam-driven generating plant. Another 300-kilowatt converter was installed on the Balboa dock of the Panama Railroad Company for the operation of the direct-current cargo-handling cranes, enabling Balboa power plant to be shut down.

New Panama waterworks system.—The electrical work in connection with the installation of motor-driven pumps and auxiliary apparatus and lighting systems in the three pumping plants and the filtration plant of the new Panama waterworks system was turned over to the electrical division by the municipal division on July 15, 1914, and was completed during the fiscal year.

Relay pumps and pumping barge.—Two 655-horsepower motor-driven pumps with necessary auxiliaries were installed on a floating barge as part of the permanent equipment for the locks. One 550-horsepower motor-driven relay pump was installed at Ancon for the dredging division and one at Coco Solo for the breakwater construction work of that division. This pumping station was destroyed in the storm of February 9–11, 1915, and a new installation had to be made. Five miles of 11,000-volt transmission line from Cristobal to Coco Solo Point were constructed and three 500-K.V.A. 2,200/11,000 volt transformers installed in Cristobal substation and three similar transformers in a box-car portable substation in connection with the Coco Solo relay pump work.

Balboa Dock lighting.—An entirely new lighting system containing approximately 150 tungsten lamps of 250 watts capacity each was constructed on Balboa Dock.

Radio station.—The electrical work in connection with the construction of the Darien substation and the installation of switchboards, underground and overhead distribution systems, house-lighting systems, etc., for the radio stations at Colon, Darien, and Balboa was done for the Navy Department during the fiscal year.

Berm cranes.—The electrical equipment of the four berm cranes formerly used in the construction of the Pacific locks which are to form part of the new Balboa coaling plant was removed from the cranes, completely disassembled, and thoroughly overhauled and repaired. Its reinstallation in the cranes has been begun and the first crane 80 per cent completed during the fiscal year.

Street-lighting systems.—New series incandescent street-lighting systems are being installed in the permanent towns of Ancon-Balboa, Pedro Miguel, Gatun, and Cristobal, and at the Army posts at Forts Grant and Randolph. The work in the four Panama Canal towns has been carried to 90 per cent of completion during the fiscal year. Material is on order for the systems at the two Army posts, but no construction work has as yet been done.

The lights are of the new gas-filled, tungsten-filament type, 6.6 amperes, 150-candlepower rating, and are inclosed in 14-inch polycased globes mounted on top of ornamental cast-iron posts. The spacing varies from 150 to 220 feet, depending on local conditions. The mounting height is 10 feet 3 inches to the center of the globe.

The lights are supplied by 6.6 ampere constant-current transformers through No. 6 B. & S. gauge band steel armored, lead sheathed, varnished cambric insulated, single-conductor cables, laid directly in the ground. Where conduit lines are availiabe for return runs to the substations they are used and the steel armor is omitted.

The construction of the new street-lighting systems for The Panama Canal, exclusive of the Army posts, has involved the installation of 520 posts, 33 of which are a combination type for holding a fire-alarm box in addition to the street light, 121,000 feet of armored cable, and 31,000 feet of unarmored cable. There will be 367 lights in the Ancon-Balboa district, 22 at Pedro Miguel, 57 at Gatun, and 74 at Critsobal. The total costs to date are as follows:

	Ancon-Balboa.	Pedro Miguel.	Gatun.	Cristobal.
Engineering and surveys	$56.56	$1.98	$10.00	$17.86
Cables and transformers	14,947.84	[1] 80.45	1,733.46	2,615.99
Posts, globes, and lamps	7,645.98	577.20	1,623.34	[1] 1,262.16
Miscellaneous				45.00
Division expense	1,017.94	24.38	149.06	135.43
Total	23,668.32	684.01	3,515.86	4,076.44

[1] Charges not completed on June 30, 1915.

Underground conduit and distribution systems.—A large amount of construction work has been done in connection with the installation of underground conduit and electrical distribution systems for light, power, telephone, telegraph, and fire-alarm service in the permanent towns and for the supply of coaling plants, dry docks, pumping stations, Army posts, etc. This work has involved the construction of 39,675 linear feet of conduit line containing from 2 to 16 ducts, 139 concrete manholes, 10 concrete transformer houses, 98 handholes, and the installation of 171,400 feet of primary and secondary light and power cable, and 30 transformers. The following tabulations show details of this work:

Details of construction work on underground conduit and distribution systems.

District.	Installed.												
	2-way conduit.	4-way conduit.	6-way conduit.	8-way conduit.	12-way conduit.	16-way conduit.	Transformer manholes.	Cable-pull manholes.	Handholes.	Transformer houses.	Primary cable.	Secondary cable.	Transformer.
	Lin. ft.	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*					*Lin. ft.*	*Lin. ft.*	
Ancon-Balboa-Corozal	1,288	5,785	2,268	5,491	2,026	2,184	20	41	76	2	67,340	30,880	23
Fort Grant		3,843		3,146			10	16	22		3,723	7,668	5
Pedro Miguel		827					1	2			1,800		
Gatun		1,739		569			8	9			8,681	2,855	
Cristobal-Colon		[1] 3,450	[1] 430	920 [1] 5,434		[1] 305	2	3 25		8	36,530	8,500	2
Darien radio								2				3,425	
Total	1,288	15,644	2,698	15,560	2,026	2,489	41	98	98	10	118,074	53,328	30

[1] Work done by Panama Railroad for electrical division.

Details of construction costs on underground conduit and distribution systems.

District.	Engineering and surveys.	Excavation and back fill.	Duct material, placing and encasement.	Manholes and pullholes.	Cables and transformers, material and installation.	Miscellaneous.	General expense (division overhead).	Total.
Ancon-Balboa-Corozal	$1,286.50	$11,452.35	$32,556.60	$8,227.58	$48,881.65	$2,446.71	$6,956.71	$111,808.10
Fort Grant								6,657.20
Pedro Miguel	29.78	341.04	438.22	178.37	2,121.63		113.33	3,222.37
Gatun	63.22	1,076.37	1,739.75	539.57	5,428.92	441.57	885.06	10,174.46
Cristobal-Colon	327.89	670.60	1,518.04	637.04	27,754.57	145.20	1,192.70	32,573.63 [1] 18,546.21

[1] Covers cost of work done for electrical division by Panama Railroad. Charges were not classified.

Electrical installation work in buildings.—Designs and specifications were prepared and material purchased and installed for the following concrete buildings of The Panama Canal, United States Army, and the Navy Department:

Panama Canal: Panama Railroad passenger station at Balboa; Panama Railroad passenger station at Corozal; Panama Railroad freight house at Panama; oil storehouse at Balboa; commissary supplies storehouse at Cristobal; commissary supplies storehouse at Balboa; dispensary at Balboa; medical storehouse at Ancon; cow barn, Corozal; dairy house, Corozal; shop and office buildings, Gatun, Pedro Miguel, and Miraflores Locks; fire station, Balboa; substation, Gamboa; pumping stations and filtration plants, Gamboa, Miraflores, and Ancon (five buildings); administration building, Balboa Heights;[1] office building, Balboa shops;[1] 39 four-family quarters, Balboa;[2] 11 two-family quarters, Balboa.

United States Army: Headquarters building, Fort Grant; commanding officer's quarters, Fort Grant; 2 major's quarters, Fort Grant;[1] 6 two-family captain's quarters, Fort Grant;[3] 4 four-family lieutenants' quarters, Fort Grant;[4] 5 four-family noncommissioned officers' quarters, Fort Grant;[4] 8 one-company barracks buildings, Fort Grant;[5] storehouse, Naos Island.

United States Navy: Substation, Darien; radio stations, Darien, Balboa, Colon (7 buildings).

In addition to the work listed above in concrete buildings, similar work was performed in 134 frame buildings that have been constructed, remodeled, or taken down and reerected in the last fiscal year.

MUNICIPAL DIVISION.

The municipal division continued the design, maintenance, and operation of all roads, water pumping and purification plants, pipe lines, and such building construction work as directly concerned this division.

It is of especial interest to note the successful completion of the Miraflores purification and filtration plant with its necessary adjuncts, the pumping stations at Gamboa and Ancon, together with the 60,000 feet of 24 to 30 inch pipe line. This is the last of the permanent purification plants to be built for the permanent townsites, as this single plant will furnish water for the towns of Paraiso, Pedro Miguel, Corozal, Balboa, Balboa Heights, Ancon, and the city of Panama. During the year the average amount of water handled by the municipal division plants was 606,690,968 gallons per month.

Your attention is also invited to the large amount of permanent road building, grading, and sodding handled by this division, the greater portion of the permanent landscape work being accomplished during the year.

The annual report of the municipal engineer follows:

MUNICIPAL DIVISION.

D. E. Wright, Municipal Engineer.

The organization of the division remained practically the same as described in the report for 1914, except as certain changes were brought about by the completion of construction work on the new Panama waterworks during the latter part of the fiscal year. In September, the headquarters of the division were moved to the new administration building in Balboa Heights, and the clerical force and the drafting force of the division office were consolidated with the forces in that building. The work of the division was divided into four sections and the report for the year will be given under the following headings, giving an outline of the work accomplished in each of the four sections.

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[1] Partly completed last fiscal year.

[2] 20 partly completed last fiscal year; 10 under construction.

[3] 3 under construction.

[4] 2 under construction.

[5] 4 under construction.

NORTHERN DISTRICT.

The northern district covers that part of the Canal Zone lying north of Darien and includes the city of Colon, and all the municipal work in this district with the exception of the operation of the water purification plants is in charge of Superintendent E. H. Chandler, reporting direct to the municipal engineer.

During the year the usual maintenance and repair work was performed on the water and sewer systems and on the roads and streets in this district.

In connection with the maintenance work on the water and sewer systems, a monthly inspection and test of all fire hydrants and valves was made and the sewer systems were flushed at frequent intervals.

No extensive repairs were made to the roads during the year, but the roads and streets were maintained and kept in good condition and were resurfaced as this became necessary in certain sections.

The two reservoirs in this district were maintained, each being in charge of a custodian who has authority of a police officer for the purpose of preventing trespassing on the water shed of the reservoirs. In addition to the usual duties of the position, the custodians kept daily record of the rainfall at their respective stations and reported same to the Meteorological section.

There were four pumping stations operated by the division in this district in connection with the water supply, and the results of the operations for the year are as given in the following statement:

Station.	Average number of gallons pumped per month.	Period.
Mount Hope	112,219,000	July 1, 1914, to June 30, 1915.
Agua Clara (Gatun)	26,908,000	Do.
Monte Lirio	1,369,800	Oct. 1, 1914, to June 30, 1915.
Frijoles	220,259	Do.

The maintenance work in the city of Colon was performed as usual by the municipal division and the cost of same paid for from water rentals. This work included the usual maintenance and repair work on the streets and on the water and sewer systems, including the operation of the sewage pumping station. All private water connections in the city of Colon are metered and the municipal division had charge of the installation and care of these meters as well as the work of reading the meters and preparing the quarterly water rent bills and the collection of the water rentals. The following tables give information regarding the water consumption and the water rental collections in the city of Colon.

Quarter ending—	Number of bills.	Amount of bills.	Consumption.
			Gallons.
Sept. 30, 1914	943	$26,160.50	135,413,375
Dec. 31, 1914	952	24,387.30	153,574,075
Mar. 31, 1915	953	24,853.10	165,729,125
June 30, 1915	955	22,363.20	179,444,150

Two hundred and fifty-nine buildings in the city of Colon were destroyed by fire on April 30, 1915, among them being those used by the municipal division for an office and shop and for the sewage pumping station. These latter buildings were replaced by new ones and same were occupied within about six weeks from the date of the fire. The cost of these new buildings was charged to the balance remaining from the $800,000 appropriation for sanitation in Panama and Colon. The burning of such a large number of buildings caused a considerable reduction in the amount of the water rent bills for the quarter in which the fire occurred, as indicated by the above tables. There was no great reduction, however, in the total consumption of water, as the inhabitants of that part of the city that was burned were quartered at various points in tents and arrangements were made for furnishing them with necessary water during the last two months of the fiscal year without charge. The extra cost of all additional maintenance work due to the fire was charged to the regular maintenance account paid from water rentals.

The clearing of the D Street storm sewer was commenced June, 1915, and was 40 per cent completed at the close of the year.

A summary of the more important items of construction work performed by the municipal division in the northern district during the year follows:

CANAL WORK.

Concrete reservoir at Gatun.—Under special authority a 300,000-gallon concrete reservoir was constructed at Gatun to take the place of the 430,000-gallon steel tank which was considered unsafe for further use. After the completion of the reservoir the steel tank at Gatun was dismantled and the tank and tower turned into stock at Mount Hope, the cost to the municipal division of dismantling the tank and tower being approximately $1,400. The cost of construction of the concrete reservoir and the installation of the pipe line to Gatun, a distance of about 2,100 feet, was approximately $14,487.34.

Work at oil-handling plant and oil-tank farm, Mount Hope.—Under authority of work request from the division of terminal construction the site for the oil-handling plant at Mount Hope was graded, concrete floors were installed, and the manifold with the necessary drainage system was constructed. The pipe line installed from the pumping station to the docks consisted of 5,700 feet of 10-inch pipe and 5,700 feet of 12-inch pipe. The total cost of the installation and the other work done by the municipal division at the oil-handling plant was approximately $40,327.95.

Under authority from the division of terminal construction a water distribution system was installed for the oil-tank farm at Mount Hope, consisting of 2,800 feet of 4-inch second-hand pipe and 3,000 feet of 6-inch second-hand pipe, with the necessary valves and other fittings. The total cost of this water distribution system was $2,650.

CITY OF COLON.

No new construction work was performed in the city of Colon during the year with the exception of the construction of a temporary wooden building for the sump pumping station and for the office of the cashier of the water service in Colon, this being to replace the building destroyed by the fire of April 30. The cost of this building was charged to the remaining balance of the $800,000 appropriation for sanitation in the cities of Panama and Colon. Additional installation which was necessary in Colon on account of the fire of April 30, and the cost of which was charged to the maintenance account, consisted of 4,000 feet of 4-inch galvanized-iron pipe, 11 range closets, and 33 shower baths.

ARMY WORK.

Toro Point water supply.—A water-supply system for the military was installed at Toro Point, the work consisting of the construction of the pump station and the installation of equipment, and the installation of a distribution system and the construction of a small 60-cubic yard concrete dam across the Arenal River. The pump which was installed was a direct connected motor-driven centrifugal pump with a capacity of 500 gallons per minute. This pump is to be used for fire protection, the regular water supply being obtained by gravity. The water distribution system consisted of 4,000 feet of 8-inch and 5,900 feet of 6-inch pipe. The total cost of the work at Toro Point was $11,429.48.

Margarita Island.—Preliminary municipal work was performed at Margarita to the extent of preparing plans and making up estimates for roads and walks, water and sewer lines, and the pump station and storage tanks, but no construction work was done prior to June 30 by this division. The total estimated cost for projects approved to date for municipal work at Margarita is $60,000.

SOUTHERN DISTRICT.

The southern district covers that part of the Canal Zone including Darien and points south of there, including the city of Panama. All municipal work in this district is in charge of Superintendent W. J. Spalding, reporting direct to the municipal engineer.

The maintenance work carried on in this district was similar to that referred to in connection with the report of the northern district. Early in the fiscal year the towns on the west side of the canal were depopulated and abandoned by the canal and turned over to the Army, and military camps were established at Empire and at Culebra in addition to the camp at Las Cascadas previously established. The municipal division, however, continued to have charge of all municipal work in this part of the district, including the care of the two reservoirs and the operation of the two pumping stations and the condensers located there, for the purpose of supplying water to the Army at Culebra, Empire, and Las Cascadas, and also for the purpose of furnishing water to the dredging division for their operations in Gaillard Cut.

The increased operations at Paraiso made it necessary during the year to put in an additional pipe line for supplying water from the purification plant at Miraflores to Paraiso. This called for the installation of approximately 5,000 feet of 6-inch pipe, and also one additional pump.

After the completion of the purification plant at Miraflores the temporary pumping station at Miraflores and the old pumping station and pressure filter plant at Ancon were abandoned and removed, and all water for the southern end of The Panama Canal is now furnished by the Miraflores plant.

The report of operations of all pumping stations in the southern district is as given by the following statement:

Station.	Average number of gallons pumped per month.	During the period—
Ancon	19,056,722	July 1, 1914, to Mar. 16, 1915.
Miraflores temporary station	136,221,468	Do.
Cucaracha (Tanks)	5,423,166	July 1, 1914, to June 30, 1915.
Cucaracha (Mount Zion)	4,498,265	Do.
Comacho	2,928,916	Do.
Gamboa	32,528,142	July 1, 1914, to Feb. 1, 1915.
Paraiso	4,199,230	July 1, 1914, to June 30, 1915.
Caimito	160,000	Oct. 1, 1914, to June 30, 1915.
Station No. 1, Gamboa	236,815,000	Mar. 1, 1915, to June 30, 1915.
Station No. 2, Miraflores	23,993,000	Do.
Darien station	150,000	June 1, 1915, to June 30, 1915.

In accordance with the terms of an official circular of the Governor, the care and maintenance and operation of all water distribution and water-supply systems on the Zone was transferred to the municipal division on September 1, 1914. This included the water-supply systems of the Panama Railroad Company at Monte Lirio and at Frijoles and certain other water-distribution systems of the Panama Railroad and of other divisions of The Panama Canal. By this same circular rates were established for the sale of fresh water to steamers and the municipal division was given charge of the sale of this water over the docks.

The following is a statement of the quantity of water sold to steamers by the municipal division during the fiscal year:

Month.	At Cristobal.		At Balboa.	
	Number of steamers.	Gallons of water.	Number of steamers.	Gallons of water.
September	30	572,850	23	831,240
October	50	752,265	19	464,020
November	40	668,353	30	817,193
December	65	823,669	36	844,355
January	49	849,748	36	1,279,218
February	64	1,332,905	41	1,298,922
March	86	2,220,440	44	1,232,000
April	71	1,606,589	37	960,100
May	81	1,541,697	36	766,700
June	71	1,736,330	38	1,015,875
Total	607	12,104,846	340	9,509,623

In the city of Panama the usual maintenance work was performed by the municipal division on the water and sewer system and the pavements. The work of maintenance and operation in the city included the installation of water meters on new connections and the repair and maintenance of all water meters installed on private connections and the preparation and collection of water-rent bills for water consumed. A statement of the water-rent bills rendered during the year is given in the following table:

Quarter ending—	Number of bills rendered.	Net amount of the bills.
Sept. 30, 1914	2,240	$36,368.15
Dec. 31, 1914	2,269	42,120.85
Mar. 31, 1915	2,282	39,896.85
June 30, 1915	2,289	38,783.75

The brick pavement on the Caledonia bridge was renewed during the year, the cost of this being charged to the Panama Railroad Company. All other repair work on the streets and on the water and sewer systems, including replacement, was charged to the Panama Government, payment for same being made from the quarterly water-rent collections in accordance with the agreement with the Republic of Panama.

All plumbing inspection work in the city of Panama, as well as the inspection of plumbing in the Canal Zone was handled by employees of this division.

A summary of the more important items of construction work performed by this division in the southern district during the year follows:

CANAL WORK.

New Panama waterworks.—The work on the new Panama waterworks was completed during the fiscal year. The supply line being Gamboa and Miraflores which was installed during the year included a total of 59,762 linear feet of cast-iron pipe, the cost of the installation being as shown by the following table:

Size of pipe.	Length of pipe.		Cost of pipe fittings and lead and leadite.	Cost of excavation.	Cost of laying and backfill.	Total cost.	Cost per foot.
	Bought.	Laid.					
	Lin. ft.	*Lin. ft.*					
36-inch	19,045	18,790	$92,771.80	$9,035.72	$18,176.07	$120,636.59	$6.42
30-inch	39,620	38,972	168,075.75	16,562.49	39,763.26	225,620.50	5.78
24-inch	2,100	2,000	7,073.03	1,178.78	2,387.91	10,694.01	5.35
Total						356,951.10	

The cost of the construction of pump stations Nos. 1, 2, and 3 and of the abandoned pump station, with the equipment installed in stations Nos. 1, 2, and 3, is given in the following table:

Pump station.	Preliminary work.	Construction of building with necessary grading and paving.	Machinery, fittings, and installation.	Total cost.
No. 1, at Gamboa	$7,050.38	$26,435.62	$28,067.80	$61,553.80
No. 2, at Miraflores	815.48	22,785.75	16,473.00	40,074.23
No. 3, at Balboa	11,360.98	24,152.04	30,893.81	66,406.83
Abandoned station at Miraflores [1]	9,744.84	22,874.52		32,619.36
Total	28,971.68	96,247.93	75,431.61	200,654.22

[1] The abandoning of the original pump station No. 1 at Miraflores was due to the heavy rise in chlorine in the Miraflores Lake water, as explained in detail in the annual report for the fiscal year 1914. This abandoned station was turned over to the fortification division for use as a storehouse. Cuts of the pump stations were given in the annual report for the fiscal year 1914.

The trench for the Miraflores-Gamboa trench line was excavated by contract at a total cost of $22,573.22.

The construction of the Miraflores purification plant, which was about 45 per cent completed on June 30, 1914, was completed and the plant placed in operation on

March 16, 1915. Cuts and descriptions of the plant were given in the annual report for 1914. The purification plant consists of the following units at Miraflores: The wash-water tank, the aeration basin, the head house, the sedimentation basin, the filter building and pipe gallery, the laboratory and quarters, the clear-water basin, and the injection chamber. The total cost of the plant was $558,168.41, the cost of the work done during the fiscal year 1915 amounting to $203,625.12.

The delivery of water from the purification plant at Miraflores to pump station No. 3 at Balboa is through three parallel pipe lines, each 21,000 feet in length, 30, 20, and 16 inches in diameter, respectively. This distribution system was approximately 96 per cent completed on June 30, 1914, and the work was finished early in the fiscal year 1915. The cost of the work on this pipe line to June 30, 1914, was $191,493.73, and the cost of the work done on it in the fiscal year 1915 was $6,662.30.

As a part of the new Panama waterworks an extension was made to the existing high-service reservoir on Ancon Hill, at elevation 300, by constructing an addition having a capacity of 1,500,000 gallons. This work was practically completed at the close of the last fiscal year.

The following statement gives a summary of the cost of the new Panama waterworks construction, complete:

Item No.	Description.	Cost.
1	Preliminary work	$4,130.08
2	18, 20, 36 inch pipe lines	198,157.03
3	24, 30, 36 inch pipe lines	356,951.10
4	High-service reservoir, Ancon	69,429.73
5	Abandoned pump station	32,619.36
6	Pump station No. 1, Gamboa	61,553.80
7	Pump station No. 2, Miraflores	40,074.23
8	Pump station No. 3, Balboa	66,406.83
9	Miraflores filter plant	547,690.57
10	Hypochlorite injection chamber	10,477.84
	Total cost	1,387,490.57

Balboa townsite work.—Work was in progress during the entire year on the construction of roads and walks and water and sewer systems and the grading and sodding of grounds in the Balboa townsite. This work was under the landscape architect from July 1 to November 1, and under the municipal division for the balance of the year. There was a total of 29,200 linear feet of asphaltic concrete streets constructed in the townsite during the year, at an average cost of approximately $1.90 per square yard, the cost of this street construction being as shown by the following statement:

Preparing subgrade	$22,710.80
Constructing curb and gutter	35,040.00
Laying Telford base	35,688.40
Placing asphaltic concrete	25,955.20
Total, material and labor	119,394.40

There was a total of 7,600 linear feet of gravel paths with concrete block edging laid, with an average width of 6 feet, or the equivalent of 5,066 square yards, at a total cost of $1,367.82. In addition there was a total of 2,977 square yards of concrete pavement laid, having an average depth of 6 inches. This concrete pavement was laid in the vicinity of the administration building, the total cost of the work being $4,167.80. It was necessary to construct curtain walls on which to support a large portion of this concrete pavement, and this necessarily increased the cost of construction very materially. In connection with the concrete pavement around the administration building it was necessary to construct two flights of concrete steps, one on the south side of the building with 108 risers and three concrete landings, the total width of the steps being 40 feet, and the cost of the entire flight approximately $13,000; the second flight of steps was on the north side of the building, and has a width of 12 feet and cost $5,009.59.

There was a total of 21,000 cubic yards of excavation necessary for the grading around the administration building, at a total cost of $63,000. In the vicinity of the administration building and in the Balboa townsite there was a total area of 235,000 square yards graded, at a cost of $53,450, and a total area of 185,000 square yards sodded and planted in grass, the cost of this work being $16,650.

The total length of sewer pipe installed in the Balboa townsite was 11,791 feet, at a cost of $7,400.54, as shown by the following table:

Size of pipe.	Length.	Cost.
	Feet.	
6-inch	4,804	$1,489.17
8-inch	3,054	2,596.45
10-inch	2,956	2,098.76
12-inch	717	602.18
15-inch	260	613.98

The water system in the townsite included the installation during the year of a total of 4,190 feet of pipe at a cost of $4,071.90, as shown in the following table:

Size of pipe.	Length.	Cost.
	Feet.	
6-inch	1,790	$1,253.90
8-inch	1,200	1,222.00
10-inch	1,200	1,596.00

An earth fill was placed in the part of Balboa townsite lying to the west of the Prado, a total of 105,817 cubic yards of material being required. The material for this fill was obtained from Diablo Hill, and all of the work was done by contract at a cost of 33 cents per cubic yard.

Cemetery ridge work.—The necessary roads were constructed and the water and sewer lines installed for the houses located on cemetery ridge, Balboa. This work consisted of the laying of 590 feet of 6-inch vitrified pipe and 141 feet of 8-inch vitrified sewer pipe and 340 feet of 4-inch and 520 feet of 6-inch cast-iron water pipe, and the construction of 666 square yards of asphaltic concrete pavement. This work as a whole was approximately 99 per cent completed on June 30.

Special road work, Ancon district.—A 12-foot macadam road with the necessary ditches, culverts, etc., was constructed from back of the Ancon corral to connect with the Bishops Hollow Road near the low-service reservoir, a length of 900 feet at a total cost of $1,750.

An asphaltic concrete road 18 feet in width was constructed from the Ancon post office for a distance of 955 feet to intersection with the Tivoli Road, the cost of this work being $5,209.80.

The work of widening the street known as the Bishops Hollow Road and the construction of an asphaltic concrete pavement in same 22 feet in width, which was commenced the latter part of the year, was 84 per cent completed on June 30. The cost of the work to that date was $21,384.

Ancon outfall sewer.—The sewer outfall from the Ancon district was diverted from the Panama system and run into the Curundu River, this work requiring the installation of 746 feet of 8-inch, 2,619 feet of 10-inch, and 1,646 feet of 12-inch pipe. The cost of the work was $3,526.15.

La Boca silver town.—Under special authority an extension of the silver town of La Boca was made by the construction of blocks A and B. This included the construction and installation of the following:

16-foot road, macadam	linear feet..	1,300
18-foot road, macadam	do....	400
Curb and gutter	do....	4,140
Grading	square yards..	37,332
20-inch concrete pipe	linear feet..	276
15-inch vitrified pipe	do....	759
12-inch vitrified pipe	do....	182
8-inch vitrified pipe	do....	116
6-inch vitrified pipe	do....	1,521
6-inch cast-iron pipe	do....	1,349
4-inch cast-iron pipe	do....	1,252

The total cost of this work was $19,447.40.

Division of terminal construction.—Under authority of a work request from the division of terminal construction a complete piping system from the Balboa oil-handling plant was installed, this work including the erection of the manifold and the installation of the pump and the laying of a 10-inch crude-oil line, a 6-inch Diesel oil line and a 4-inch water line from the pumping plant to the oil berth a distance of approximately 2,300 feet. A 12-inch suction line and a 10-inch discharge pipe, each 3,840 feet in length, were installed from the oil-handling plant to the storage tanks. From the storage tanks to Paraiso, a total distance of approximately 34,968 feet, the following lengths and sizes of pipes were laid as a distribution system for points between Balboa and Paraiso:

	Feet.
10-inch pipe	8,527
8-inch pipe	22,676
9-inch pipe	2,086
7-inch pipe	1,680

The cost of the work of this division on the oil-handling plant and the pipe-line distribution system amounted to $47,535.46.

Under special authority a permanent 6-inch cast-iron water line was laid to the fuel-oil handling plant, at Balboa, the line consisting of 1,808 linear feet of 6-inch pipe, and the cost of the work was $1,446.40.

A partial piping system was installed in Dry Dock No. 1, Balboa, the work being approximately 95 per cent completed on June 30, 1915. The estimated cost of the work was $2,500.

Panama Railroad Company.—Under authority of a work request from the Panama Railroad Company, a sewer system was installed for the San Miguel district, consisting of 1,800 linear feet of 8-inch pipe and 259 feet of 6-inch pipe, at a total cost of $1,029.62.

The work of grading the grounds and paving and constructing the water and sewer lines on the Huerta Sandoval tract in Panama city to be used for stable lots, was done by the municipal division at the request of the Panama Railroad, the cost of the work amounting to $6,712.83 being charged to the Panama Railroad. The work included the construction of 2,333 square yards of concrete pavement, and the installation of 475 feet of 15-inch and 1,368 feet of 8-inch drainage pipe and 554 feet of 6-inch and 564 feet of 4-inch water pipe.

The brick pavement on the Calidonia Bridge in Panama city was renewed by the municipal division at the expense of the Panama Railroad Company, a total of 961 square yards of brick pavement being relaid at a cost of $2,957.54.

Health department.—On request of the health department the quarantine reservation on Balboa dump was graded and the necessary water and sewer systems were installed and roads constructed. The work done consisted of the following:

Grading	square yards	15,358
Curb and gutter	linear feet	2,410
18-foot macadam road	do	740
16-foot macadam road	do	640
10-inch vitrified pipe installed	do	275
8-inch vitrified pipe installed	do	114
10-inch galvanized-iron pipe installed	do	275
6-inch sewer pipe laid	do	1,464
6-inch cast-iron pipe laid	do	1,594
4-inch cast-iron pipe laid	do	407

The total cost of this work was $14,108.10.

Corozal farm.—Under authority from the health department a road and water and sewer system was constructed to take care of the Corozal poor farm and insane wards. This work included the installation of 2,139 feet of 4-inch cast-iron water pipe and 2,144 feet of 8-inch vitrified pipe, and the construction of 2,400 feet of 12-foot macadam road. The total cost of this work was $6,270.

A total of 3,800 linear feet of concrete ditch was constructed along the two sides of the cemetery hill, Balboa, and necessary grading work in connection with same performed by the municipal division for the health department. The cost of this work was $2,850.

Supply department.—A park area was constructed by the municipal division for the supply department in front of the Ancon commissary. The work consisted of the construction of 1,714 square yards of asphaltic concrete pavement and 1,689 linear feet of curb and gutter, and 176 square yards of concrete pavement, and the installation of 670 linear feet of 12-inch drainage pipe. A fill of 2,500 cubic yards was made. The total cost of the work was $7,935.70.

Electrical division.—On work request from the electrical division the municipal division constructed an extension of the east wall of the Miraflores spillway, this work requiring the construction of 2,000 cubic yards of concrete wall at a total cost of approximately $14,480.28.

Fortification division.—Under authority of work request from the division of fortifications a 6-inch water line was installed from Fort Amador to Naos Island and a 4-inch line from Naos Island to Perico. The lines installed consisted of 7,805 linear feet of 6-inch pipe and 1,092 linear feet of 4-inch cast-iron pipe. The total cost of the work was $3,515.88.

A water main was installed from a point near the East Balboa Hotel to Fort Amador by way of the radio station road, the line consisting of 7,253 feet of 8-inch and 1,000 feet of 6-inch cast-iron pipe. The cost of the work, which amounted to $8,765.29, was charged to the fortification division and the Navy Department.

Locks, operation department.—Under special authority an office and repair shop building was constructed by the municipal division at the Pedro Miguel Locks and one at the Miraflores Locks. The cost of the building at Pedro Miguel was $17,507.84, and the one at Miraflores was $19,854.

Miscellaneous.—Under authority from the bureau of clubs and playgrounds there were two tennis courts constructed, one of concrete at Ancon at a cost of $718.39, and one of asphaltic concrete at Balboa Heights at a total cost of $815.

At the request of the supply department a 12-inch cast-iron water line was installed from Balboa to the lumber yard, for fire protection. The cost of installing this line for a total length of 2,300 feet with the necessary fire hydrants was $4,200.

Under special authority from the Navy Department a 12-foot macadam road was constructed from the main Balboa road to the radio station on Balboa dump, a distance of 4,416 linear feet, with necessary culverts and drainage ditches. The cost of the work was $9,500.

Under authority of a deposit made by the Panama Brewing & Refrigerating Co., a 6-inch cased well 302 feet in depth was driven on their lot in Panama city.

PANAMA CITY.

Concreting B Street.—Under authority of special deposits made by the Panama Government and by the Panama Tramways Co., B Street in the city of Panama was concreted from Twentieth Street to the Zone boundary line. This work consisted of the laying of 4,266 square yards of concrete street, an average width of 20 feet, the cost of this work being $11,280.

Curb and gutter at bull ring.—At the request of the Panama Government and under authority of a cash deposit made by them there was a total of 612 linear feet of curb and gutter and 490 square yards of macadam road constructed at the junction of the Corozal and Sabanas Roads, near the bull ring. The cost of the work was $1,500.

ARMY WORK.

Fort Amador.—At Fort Amador preliminary surveys were made and plans and estimates worked up and submitted covering the entire project as proposed in September, 1914. The work was approved on the basis of two authorities, dividing the total amount into the following: An estimate of $62,000 to be charged to the $700,000 appropriation, and one of $73,500, chargeable to the $1,290,000 appropriation. At the time the two estimates were approved it was intended that the work covered by the $62,000 estimate should be done during the fiscal year 1915, and the balance of the work covered by the second item should be done during the fiscal year 1916. But it was later decided that work could be carried on under both of these projects during the year 1915, and arrangements were made to proceed with the work accordingly. The following is the status of the two projects at Fort Amador on June 30, 1915:

	$62,000 estimate.	$73,500 estimate.
15-inch vitrified sewer pipe laid ... feet..	172	....
12-inch vitrified sewer pipe laid ... do....	587	....
10-inch vitrified sewer pipe laid ... do....	615	....
8-inch vitrified sewer pipe laid ... do....	957	499
6-inch vitrified sewer pipe laid ... do....	3,211	3,034
8-inch cast-iron water pipe laid ... do....	2,989	2,300
6-inch cast-iron water pipe laid ... do....	60	606
Ground cleared ... acres..	9.7	....
Ground graded ... sq. yds..	46,938	....
Grading for parade grounds ... do....	45,625	....
20-foot road constructed ... feet..	3,800	3,935
16-foot road constructed ... do....	....	1,550
14-foot road constructed ... do....	....	700
12-foot road constructed ... do....	600	....
8-foot road constructed ... do....	811	....
Curb and gutter constructed ... do....	4,866	10,368
Walks constructed ... sq. yds..	1,547	....

The work under the $62,000 estimate was 98 per cent complete, and the work under the other project was 50 per cent complete on June 30, 1915.

Staff headquarters.—An authority was issued for the expenditure of $7,500 for grading and for water and sewer pipe installation and the construction of the necessary roads at the point selected for the residence of the commanding general and for staff headquarters, Balboa Heights, in the vicinity of the Ancon quarry. The work done consisted of the following:

Grading	square yards	3,500
8-inch water pipe laid	linear feet	1,242
6 and 8 inch sewer pipe laid	do	1,537
Asphaltic concrete road constructed	square yards	1,895
Road subgraded	linear feet	400

The work was 69 per cent completed on June 30.

General.—Surveys were made and plans and estimates prepared and submitted for the municipal work for the Army at Corozal, the municipal work consisting of the necessary grading and the construction of the roads and installation of water and sewer mains for the Engineers Corps, Signal Corps, Ambulance Corps, and Cavalry and Artillery stables and sheds. The estimated cost of this work, exclusive of the overhead charges, was $40,000. Construction work was started the latter part of June and was approximately 2 per cent completed on June 30, 1915.

OPERATION OF WATER PURIFICATION PLANTS.

The operation of the rapid sand filter plants, the inspection of the reservoirs, and the laboratory control of the water supplies in the Canal Zone was in charge of Mr. George C. Bunker, physiologist of the division.

The Mount Hope filter plant, in operation since February 23, 1914, supplies filtered water to that portion of the northern district which lies north of and includes Mount Hope. The combined population of the district is about 33,000. The raw-water supply is obtained by gravity from Brazos Brook Reservoir, the watershed of which is uninhabited and policed. During the year an additional air receiver was installed in order to lengthen the air wash to five minutes, so that a more effective scouring of the sand would result. The sand and fine gravel in all the filters was washed. Due to the decrease in color of the raw water it has been possible to gradually reduce the alum, so that less than 50 per cent of the amount used in the month of June, 1914, was consumed in the same month of this year.

The Agua Clara filter plant, in operation since December 29, 1911, supplies filtered water to Gatun with a population of about 1,200. The raw-water supply is obtained by gravity from Agua Clara Reservoir, the watershed of which is uninhabited and policed. In the early part of the fiscal year the underdrainage system of the filters was cleaned, the sand washed, and the gravel rearranged.

The water supply for that portion of the southern district which lies south of and includes Corozal was obtained from Miraflores Lake, east of the Panama Railroad, until October 3, 1914, when the chlorine content reached 92 parts per million. On this date, water was pumped from Rio Grande Reservoir and mixed with that from Miraflores Lake. The treatment of this water supply with hypochlorite of lime was continued at the temporary pump station until February 22, 1915, when pump station No. 2 was placed in operation and water from the Chagres River arm of Gatun Lake pumped to the new purifaction plant on Miraflores Hill. Up to March 14, when the filters were thrown into service, this water was aerated, passed through the sedimentation basins in order to remove the coarse sediment, and sterilized with hypochlorite of lime before flowing by gravity to pump station No. 3.

Since that latter date, filtered and sterilized water has been supplied to that portion of the southern district south of and including Paraiso. It has been found necessary to use 20 pounds of hypochlorite of lime per million gallons of water, equivalent to 0.80 parts per million of available chlorine, in order to prevent the development of "aftergrowths" in the distribution reservoirs and pipe lines. This is the maximum amount of bleach which may be used without producing an odor and taste. It reduces the bacteria in the sterilized water as it leaves the filter plant to an average of 7 per c. c. at 38° C., and eliminates the members of the colon group as determined by production of gas in lactose bile.

The results of microscopic examinations made at the three filter plants indicate that the length of the filter runs and the amount of wash water are controlled largely by the numbers of microorganisms in the raw water. At the new Miraflores filter plant it has been found that with a rising turbidity the organisms decrease and the filter runs lengthen. As the turbidity falls, the organisms increase and the filter runs shorten. During the rainy season the fluctuation in the numbers of microorganisms and the length of the filter runs is very rapid. For example, in May the filter runs varied from a minimum of 7.2 to a maximum of 46.3 hours, and the number of standard units of Nitzchia, which clog rapid sand filters very quickly, varied from a minimum of 164 to a maximum of 690. However, with the high rate of washing, a 24-inch rise of water per minute at this plant, the percentage of wash water has not exceeded a monthly average of 3.75.

In order to increase the length of filter runs and reduce the amount of wash water at the Mount Hope and Agua Clara filter plants, where low rates of washing are used, both of the reservoirs have been treated with copper sulphate at the rate of 4 pounds per million gallons. Brazos Brook Reservoir was treated with copper sulphate on March 11. During the first 13 days of this month the average length of the filter runs was 12 hours. After the 14th, the latter increased to a maximum of 40 hours. The following table shows the effect of the copper sulphate on the microorganisms and amorphous matter:

Date.	Sample collected.	Standard units per c. c.	
		Micro-organisms.	Amorphous matter.
Mar. 10	Before treatment	141	610
Mar. 13	After treatment	57	194
Mar. 17	.....do	9	146

During the first 13 days of this month the percentage of wash water averaged 8.7, during the remainder of the month 4 per cent.

The copper sulphate treatment also affected the amount of alum necessary for the removal of the color from the raw water. During the first 18 days of the month an average of 275 pounds per million gallons was required, during the remainder of the month this was reduced to 214 pounds.

After this treatment the bacteria in the raw water increased from 205 per c. c. on the 11th to a maximum of 36,000 per c. c. on the 16th. After this date they gradually decreased to 255 per c. c. on the 31st. All of the counts were made on nutrient agar at 38° C.

Comacho and Rio Grande Reservoirs, which supply the population on the west side of the canal, have been inspected once and sometimes twice each month in order to see that the shore lines were kept in proper condition.

Further detailed information regarding the operation of the water purification plants is given in the inclosed statements marked Tables Nos. 1 and 2.

TABLE 1.—*Monthly operation data of rapid sand filter plants.*

	Mount Hope.	Agua Clara.	Miraflores.
Gallons filtered:			
Maximum	137,706,000	38,754,000	208,733,000
Minimum	98,232,000	23,794,000	204,808,000
Average	112,196,000	27,259,000	206,719,000
Percentage of wash water:			
Maximum	9.67	6.7	5.7
Minimum	2.80	3.4	2.7
Average	6.6	5.1	3.9
Filtered wash:			
Maximum	189	87	299
Minimum	71	30	153
Average	143	52	235
Alum consumed, pounds:			
Maximum	36,354	12,748	45,594
Minimum	16,046	4,176	38,452
Average	28,280	5,742	41,539

TABLE 1.—*Monthly operation data of rapid sand filter plants*—Continued.

	Mount Hope.	Agua Clara.	Miraflores.
Alum consumed, pounds per million gallons:			
Maximum	316	292	216
Minimum	114	164	119
Average	250	229	174
Length of filter runs, hours:			
Maximum	39.3	42.2	26.5
Minimum	11.2	18.0	13.1
Average	18.4	24.5	17.7
Hypochlorite of lime, pounds per million gallons:			
Maximum	....	....	20.6
Minimum	....	....	17.8
Average	....	....	19.2
Hypochlorite of lime, parts per million of available chlorine:			
Maximum	....	....	.82
Minimum	....	....	.75
Average	....	....	.78

TABLE 2.—*Monthly physical and chemical data.*

	Filter plants.					
	Mount Hope.		Agua Clara.		Miraflores.	
	Raw.	Filtered.	Raw.	Filtered.	Raw.	Filtered.
Temperature:						
Average	....	....	28.9° C.	....	....	....
Maximum	....	....	33.5° C.	....	....	....
Minimum	....	....	26.0° C.	....	....	....
Taste:						
Average	1 v	0	1 v	0	3 v	1 v
Maximum	2 g-f	1 g	3 v	1 v	4 v	1 v
Minimum	1 v	0	0	0	2 v	0
Odor:						
Average	1 v	0	1 c-v	0	3 v	1 v
Maximum	2 v-g	1 g	2 c-v	2 v	4 v	1 v
Minimum	1 v	0	0	0	2 v	0
	Parts per million.					
Color, total:						
Average	35.0	1.0	36.0	0	27.0	0
Maximum	90.0	12.0	70.0	5.0	100.0	7.0
Minimum	10.0	0	20.0	0	11.0	0
Color, true:						
Average	7.0	1.0	5.0	0	10.0	0
Maximum	16.0	12.0	5.0	5.0	20.0	7.0
Minimum	0	0	5.0	0	0	0
Turbidity:						
Average	15.0	0	17.0	0	17.0	0
Maximum	22.0	0	40.0	0	120.0	2.0
Minimum	0	0	5.0	0	2.0	0
Alkalinity:						
Average	32.5	20.0	19.8	8.7	43.1	39.7
Maximum	41.0	38.0	25.0	14.0	49.5	47.6
Minimum	20.0	9.0	15.0	5.0	35.9	27.6
Hardness, soap:						
Average	28.7	29.1	17.8	15.9	30.0	34.6
Maximum	37.8	37.1	32.5	22.1	37.0	41.6
Minimum	22.1	23.4	15.6	15.6	24.7	32.5
Oxygen consumed:						
Average	3.18	.86	3.55	.63	2.6	.59
Maximum	5.15	1.90	5.5	1.7	2.9	.70
Minimum	1.80	.35	1.60	.10	2.4	.52

TABLE 2.—*Monthly physical and chemical data*—Continued.

	Filter plants.					
	Mount Hope.		Agua Clara.		Miraflores.	
	Raw.	Filtered.	Raw.	Filtered.	Raw.	Filtered.
	Parts per million.					
Iron, total:						
Average	0.64	0.04	0.57	0.06	0.54	0.03
Maximum	2.00	.30	1.70	.30	2.60	.35
Minimum	.15	.00	.20	0	.10	0
Solids, total at 105° C.:						
Average	95.0	93.0	67.0	57.0	104.0	59.0
Maximum	138.0	101.0	102.0	111.0	118.0	70.0
Minimum	63.0	84.0	56.0	41.0	92.0	48.0
Solids, fixed:						
Average	56.0	58.0	37.0	44.0	94.0	58.0
Maximum	92.0	69.0	66.0	93.0	106.0	66.0
Minimum	35.0	50.0	24.0	36.0	86.0	41.0
Chlorine:						
Average	5.3	5.3	5.7	5.7	9.8	9.8
Maximum	6.2	6.2	7.0	7.0	11.5	11.5
Minimum	5.0	5.0	4.5	4.5	7.8	7.8
Free carbonic acid:						
Average	5.2	8.6	1.5	5.2	2.5	3.7
Maximum	19.5	15.0	5.0	11.0	5.0	9.0
Minimum	0	.05	0	2.0	.05	0
Dissolved oxygen:						
Average	5.3	7.24	6.6	7.1	6.1	7.9
Maximum	....	....	7.9	7.8	7.7	8.7
Minimum	....	....	4.3	6.0	.14	6.57

SECTION OF METEOROLOGY AND HYDROGRAPHY.

The section of meteorology and hydrography continued to keep the permanent records of weather conditions upon the Zone, and your especial attention is invited to the report of the chief hydrographer in which the statement is made that although the rainfall throughout the year has been generally deficient we have had more than sufficient water for all purposes, even in March, the driest month of the year, during which period the lake level only fell 0.4 of a foot. It is also to be noted that the hydroelectric station is demanding approximately three times the estimated amount of water required for its purposes. This excess demand of the hydroelectric station will be increased considerably by contemplated changes in the capacity of the station units.

The report of the chief hydrographer is as follows:

SECTION OF METEOROLOGY AND HYDROGRAPHY.

F. D. Willson, Chief Hydrographer.

METEOROLOGICAL.

Several changes were made during the past fiscal year in the meteorological stations. The first-class station at Culebra was discontinued on September 12, 1914, and the instruments moved to the present location at Balboa Heights, except the rain gauge which was continued in operation. The first-class station at Ancon remained in operation until October 1, 1914, when records were discontinued. The seismographs and main equipment were transferred to Balboa Heights, and regular observation work was begun at this place on October 1, 1914.

Evaporation records at Rio Grande were discontinued on September 12, 1914.

The Gatun wind station was removed from the old administration building on October 5, 1914, to its present location on the tower of the hydrographic station about 100 yards south of the Gatun Railroad station.

The Colon meteorological office was moved from the first to the second floor of the Panama Railroad office building on October 28, 1914, with very little change in instrument exposure.

The tide registers at Colon were moved from Dock No. 1 to Dock No. 2, on December 9, 1914, and from Dock No. 2 to the present location on Dock No. 9, Cristobal, on May 1, 1915.

The rainfall station at Porto Bello was discontinued on September 1, 1914, owing to the abandonment of the American settlement.

PRECIPITATION.

The rainfall for the year 1914 was deficient at all stations except Juan Mina, El Vigia, and Colon. The annual totals ranged from 132.70 inches at Colon to 64.48 inches at Balboa Heights. The average precipitation over the Pacific section was 68.02 inches, 86.14 inches over the central section, and 115.54 inches over the Atlantic section.

The 1914 dry season rainfall amounted to but 6 per cent of the annual total in the Pacific section; 4 per cent in the central section; and 7 per cent in the Atlantic section. October was the rainiest month, in the Atlantic section and the northern part of the central section; May was the rainiest month in the southern part of the central section and northern part of the Pacific section, while on the Pacific coast November was the month during which the most rainfall occurred. March was the month of least rainfall in all sections.

The maximum 24-hour rainfall recorded during the year was 6.85 inches at Gatun, on August 12 and 13, most of which fell between the hours of 2 and 4 p. m. on the 12th. Daily quantities in excess of 4 inches were recorded as follows:

Station.	Date.	Inches.	Station.	Date.	Inches.
Colon	May 27	4.91	Gamboa	June 18	5.18
Gatun	May 22	4.43	Porto Bello	Aug. 12	4.28
Frijoles	...do....	4.35	Gatun	...do....	6.72
Monte Lirio	May 23	4.44	Monte Lirio	...do....	5.45
Porto Bello	May 26	4.06	......do	Oct. 8	4.10

The rainfall during the first four months of 1915 was generally above normal, the excess occurring in the dry-season months—January to April, inclusive. Two storms, or so-called "northers," during the period from February 9 to 11, inclusive, and from April 3 to 5, inclusive, influenced the total amount of rainfall to a great extent, the fall during these periods being general over the Isthmus, although greater over the Atlantic than over the other sections. On February 10 and 11 the precipitation at Colon in 24 consecutive hours was 7.94 inches, and a fall of 8.30 inches occurred in 24 consecutive hours at Gatun on April 3 and 4. This exceeded the maximum 24-hour precipitation on the Isthmus during the wet season of 1914. The greatest amount of precipitation on record for 24 consecutive hours is 10.86 inches at Porto Bello on December 28 and 29, 1909.

The rainfall since the beginning of the rainy season has been generally deficient, the deficiency being well marked during the month of May. The June rainfall at Balboa and Balboa Heights was the lowest on record for a period of 19 and 18 years, respectively.

Monthly records for 1914, 1915, and the station averages, are represented in Table No. 1, while the maximum rainfall of record for periods of 5 minutes, 1 hour, and 24 hours, at stations equipped with automatic registers, is shown in Table No. 2.

TEMPERATURE.

The average air temperature for the year 1914 was slightly above normal. March was the month of highest mean temperature, and October the month of lowest mean temperature on the Pacific coast, while on the Atlantic coast the highest mean temperature occurred in July and the lowest in September.

The means and extremes in air temperature for the year 1914, at the two first-class stations, are given in the following table:

Stations.	Maximum.		Minimum.		Annual mean, ° F.
	° F.	Date.	° F.	Date.	
Balboa Heights	96	Mar. 28	65	Feb. 25	81.3
Colon	91	Oct. 4	72	May 7	80.8

The absolute maximum and minimum temperature for the years of record are shown below, revised to June 30, 1915:

Stations.	Maximum.		Minimum.	
	0° F.	Date.	0° F.	Date.
Balboa Heights	97	Apr. 7, 1912	63	Jan. 27, 1910
Colon	92	June 3, 1909	66	Dec. 3, 1909

NOTE.—The lowest temperature of record on the Isthmus is 59° F., observed at Bas Obispo on Feb. 9, 1907. The maximum temperature record of 97° F., at Balboa Heights (then Ancon) was equalled at the Naos Island station on Feb. 13, 1906.

Temperature continued generally above normal during the first six months of 1915.

Monthly temperature records and other meteorological data for the year 1914 at the two first-class stations, and at the Culebra station during the eight months of record, are presented in Tables Nos. 3, 4, and 5.

WINDS.

The wind movement over the Canal Zone for the year 1914 was generally above the normal. North and northwest winds prevailed. March was the month of greatest wind movement and October the month of least wind movement at all stations except Gatun, where the minimum movement occurred in December. See Plate No. 79, Wind Roses for the year 1914, Wet and Dry Seasons, and Plate No. 80, Wind Roses, Dry Season 1915.

The following table revised to June 30, 1915, shows the maximum wind velocities of record at the first-class stations:

Stations.	Maximum velocity.		Date.
	Miles per hour.	Direction.	
Balboa Heights	59	S.	July 10, 1909
Colon	46	N.	Apr. 4, 1915

The maximum wind velocity at Colon occurred during the storm, or so-called "Norther," of April 3 to 5, 1915, the highest velocity heretofore being 40 miles from the south on July 16, 1908.

ATMOSPHERIC PRESSURE.

The mean atmospheric pressure for the year 1914 was slightly below the normal. January was the month of highest mean pressure at both stations, while the lowest mean pressure occurred in July on the Pacific coast, and in December on the Atlantic coast.

RELATIVE HUMIDITY.

The mean relative humidity of the atmosphere in 1914 was practically normal at both stations. On the Atlantic coast September was the month of highest average humidity and February the month of lowest average humidity, while on the Pacific coast the months of highest and lowest average humidity were November and March, respectively.

CLOUDINESS.

The average daytime cloudiness for the year 1914 was practically normal on the Atlantic coast, and slightly below the average on the Pacific coast. September was the month of heaviest cloudiness at both stations, while the least average cloudiness occurred in March on the Atlantic coast, and in January on the Pacific coast.

EVAPORATION.

The weather conditions during the year 1914 again favored a high rate of evaporation. Owing to the moving of the station at Ancon to Balboa Heights, evaporation records at the latter place for the month of October were lost, but the 11 months total exceeded the station average. At Gatun the annual total was above the normal, while at Colon the yearly amount exceeded all previous records. Evaporation during the first six months of 1915 has been above normal at Balboa Heights and Colon, but slightly below the average at Gatun. The monthly records are given in Table No. 6. The total evaporation for the year 1914, together with the station averages, are presented in the following table:

Stations.	Annual evaporation.		Years of record.
	1914	Average.	
	Inches.	*Inches.*	
Balboa Heights	54.811	49.986	7
Gatun	62.905	61.646	4
Colon	55.774	52.255	6½

FOGS.

Only one fog was observed during the year 1914 at either coast station, but night and early morning fogs were quite numerous over the interior. Over the Gaillard Cut section of the canal there were 139 days on which fogs were observed. The greatest number of fogs occurred here during the month of October, and the least number during the month of March. Practically all fogs lifted or were dissipated by 8.30 a. m.

SEA TEMPERATURE.

The average surface temperature of the sea water was approximately 1° F. above normal on the Atlantic coast, and 1° F. below the normal on the Pacific coast. The means and extremes for the year 1914 are given in the following table:

Stations.	Maximum.		Minimum.		Annual mean.
	° F.	Date.	° F.	Date.	
Balboa	85	Several dates	66	Mar. 22	79.0
Colon	89	Nov. 16	78	Jan. 20	82.7

TIDAL CONDITIONS.

Tide registers were continued in operation at Balboa and Colon. The tidal extremes for the years of record at these stations are given below (length of record, 8 years), table revised to June 30, 1915:

Stations.	Maximum high water.		Extreme low water.		Maximum daily range.[1]		Minimum daily range.[1]	
	Elevation.	Date.	Elevation.	Date.	Feet.	Date.	Feet.	Date.
Balboa	+11.2	Oct. 2, 1909	−10.6	Apr. 11, 1910	20.8	Apr. 11, 1910	4.9	Feb. 24, 1915
Colon	+ 1.68	Feb. 11, 1915	− 1.01	June 9, 1910	2.17	June 28, 1911	(2)	

[1] For consecutive tides.

[2] One tidal fluctuation often entirely absent at Colon.

Tidal conditions on the Atlantic and Pacific coasts for the year 1914 are shown in Table No. 7.

SEISMOLOGY.

Fourteen seismic disturbances were recorded at Ancon or Balboa Heights during the fiscal year 1914–15. Of these, four were of comparatively local origin—less than 200 miles distant. The remainder were tremors from shocks of comparatively distant origin. Three of the shocks were of sufficient intensity to be generally felt over the Isthmus. The intensity of all the disturbances ranged from I to III, Rossi-Forel scale. No damage resulted from any of the shocks. A complete list of seismic disturbances recorded at Balboa Heights during the fiscal year 1914–15 is given in Table No. 8.

The following charts and tables accompany the meteorological section of this report:

Plate No. 79. Wind Roses, year 1914, dry and rainy seasons.
Plate No. 80. Wind Roses, dry season, 1915.
Table No. 1. Monthly rainfall on the Isthmus of Panama.
Table No. 2. Maximum rainfall in the Canal Zone.
Table No. 3. Monthly meteorological data, Balboa Heights, year 1914.
Table No. 4. Monthly meteorological data, Culebra, year 1914.
Table No. 5. Monthly meteorological data, Colon, year 1914.
Table No. 6. Monthly evaporation, Canal Zone, 1914, 1915, and averages.
Table No. 7. Tidal conditions, year 1914.
Table No. 8. Seismograph records, Balboa Heights, fiscal year 1914–15.

TABLE 1.—*Monthly rainfall on Isthmus of Panama, 1914–15, and station averages.*

[Value in inches.]

Stations.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct	Nov.	Dec.	Year.
Balboa:													
1914	0.30	0.00	0.00	4.94	8.16	7.25	5.00	5.19	7.72	6.97	11.99	7.41	64.93
1915	2.23	2.73	.00	4.37	7.92	2.37	......	......	......	......	......	......	......
Average, 16 years	1.04	.51	.75	3.89	7.32	7.86	9.22	7.35	6.98	9.44	9.28	5.92	69.54
Balboa Heights: [1]													
1914	.32	.02	T.	4.80	6.98	7.28	4.32	6.09	9.60	6.44	10.35	8.28	64.48
1915	2.12	2.96	T.	5.37	6.42	2.85	......	......	......	......	......	......	......
Average, 17 years	.95	.76	.71	2.72	8.81	8.10	7.76	7.49	7.80	10.53	10.45	4.44	70.52
Miraflores:													
1914	.57	.00	.00	2.69	10.96	5.64	4.81	7.61	6.38	8.18	10.79	7.42	65.05
1915	1.67	1.17	.07	2.88	13.38	5.46	......	......	......	......	......	......	......
Average, 6 years.	1.88	1.52	.60	3.10	10.03	9.74	7.83	8.11	9.91	11.91	11.58	7.51	83.72
Pedro Miguel:													
1914	1.27	.07	.02	3.00	13.16	11.35	7.15	7.60	7.97	6.74	10.88	6.26	75.47
1915	1.03	1.69	.22	2.39	10.24	7.69	......	......	......	......	......	......	......
Average, 7 years.	1.04	.79	.32	3.17	11.37	10.27	8.50	8.21	8.69	11.64	10.86	6.47	81.33
Rio Grande:													
1914	1.08	.25	T.	.83	10.77	9.92	5.80	9.11	8.76	8.19	9.60	5.87	70.18
1915	.57	2.81	.19	3.41	9.32	8.01	......	......	......	......	......	......	......
Average, 10 years	1.39	.61	.29	3.01	11.04	9.27	9.98	9.95	10.72	12.01	10.77	5.49	84.53
Culebra:													
1914	.38	.20	.01	.62	13.26	8.06	5.28	9.73	11.12	8.20	7.77	4.25	68.88
1915	1.33	3.63	.09	3.81	7.28	10.03	......	......	......	......	......	......	......
Average, 24 years	1.68	.55	.65	3.54	11.28	8.83	9.17	10.50	11.20	11.39	12.09	7.32	88.20
Comacho:													
1914	.46	.33	.00	.49	14.15	10.46	4.94	8.22	9.17	9.92	7.34	5.38	70.86
1915	.61	3.45	.88	4.52	7.56	6.06	......	......	......	......	......	......	......
Average, 8 years.	1.15	.71	.43	3.02	12.31	10.10	9.27	10.15	10.41	12.96	12.58	5.98	89.07
Empire:													
1914	.34	.27	T.	.50	12.87	8.87	5.02	9.90	9.65	9.07	6.00	4.44	66.93
1915	.67	3.53	.24	4.96	8.56	7.11	......	......	......	......	......	......	......
Average, 10 years	.79	.54	.36	2.99	10.17	8.61	8.45	9.80	8.51	12.87	10.81	5.15	79.05
Gamboa:													
1914	.64	.23	.02	1.38	10.28	17.78	3.91	7.97	11.50	9.79	7.70	6.15	77.35
1915	1.74	2.75	.02	7.09	5.10	9.01	......	......	......	......	......	......	......
Average, 32 years	1.77	.82	.78	3.40	11.02	9.89	10.18	12.20	10.50	12.58	12.18	6.79	92.11
Juan Mina:													
1914	.44	.38	.02	1.01	8.40	12.51	9.72	12.26	17.10	20.19	8.26	2.90	93.19
1915	1.06	3.43	.20	7.74	6.91	15.14	......	......	......	......	......	......	......
Average, 4 years.	.41	.90	.17	1.24	12.09	10.99	8.78	11.63	12.04	13.07	12.44	4.76	88.52
Alhajuela:													
1914	.09	.22	.05	1.68	5.66	12.55	7.21	12.36	16.98	22.91	7.56	2.25	89.52
1915	.86	2.53	.04	8.94	8.20	8.09	......	......	......	......	......	......	......
Average, 15 years	1.14	.71	.58	2.95	12.24	12.75	12.46	12.90	11.76	13.66	14.60	6.43	102.18
El Vigia:													
1914	.28	.51	.14	2.05	7.47	17.34	8.23	12.98	18.06	22.46	10.72	5.53	105.77
1915	.39	2.34	.06	6.77	10.88	12.48	......	......	......	......	......	......	......
Average, 6 years.	.99	2.08	.60	1.91	11.71	13.95	11.09	12.83	12.78	15.90	15.70	5.59	105.13

[1] Formerly Ancon, station moved to Balboa Heights Oct. 1, 1914.

TABLE 1.—*Monthly rainfall on Isthmus of Panama, 1914–15, and station averages*—Continued.

[Value in inches.]

Stations.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Frijoles:													
1914	0.81	1.33	0.40	2.95	14.33	13.05	4.06	9.66	10.55	18.99	8.83	6.94	91.90
1915	3.63	5.66	.69	11.56	10.71	10.54	......	......	......	......	......	......	......
Average, 3 years.	1.78	2.46	.26	2.19	15.23	11.67	6.82	12.68	11.36	17.57	14.17	5.77	101.96
Trinidad:													
1914	1.57	1.16	.71	3.16	13.58	9.61	2.42	4.97	15.03	16.93	15.00	5.61	89.75
1915	2.46	8.88	1.15	9.27	8.51	13.01	......	......	......	......	......	......	......
Average, 7 years.	3.09	2.46	2.52	4.53	14.53	10.89	8.34	10.68	12.48	14.95	19.28	9.40	113.15
Monte Lirio:													
1914	.83	1.55	1.19	4.44	11.42	14.55	3.54	16.85	15.38	18.17	14.32	5.02	107.26
1915	2.54	6.57	.76	12.19	11.17	10.40	......	......	......	......	......	......	......
Average, 7 years.	3.21	3.69	2.94	4.62	14.20	13.33	11.84	11.85	12.86	16.58	21.66	9.84	126.62
Gatun:													
1914	1.63	1.07	.96	3.26	10.91	12.64	4.28	15.15	10.95	14.14	12.57	4.62	92.18
1915	1.80	13.17	.90	15.90	10.24	12.66	......	......	......	......	......	......	......
Average, 10 years	3.69	2.32	2.53	4.11	15.33	13.31	11.21	14.20	9.86	16.22	20.76	11.97	125.51
Brazos Brook:													
1914	.90	.94	1.21	7.33	13.77	15.84	10.30	14.70	13.28	22.30	16.61	5.17	121.75
1915	2.96	14.32	.96	12.17	6.41	16.48	......	......	......	......	......	......	......
Average, 8 years.	3.46	2.37	2.67	3.94	13.88	15.42	15.55	14.94	11.80	16.28	23.42	13.00	136.73
Colon:													
1914	1.35	1.32	.91	4.12	17.76	16.30	10.74	16.01	14.80	22.16	18.35	8.88	132.70
1915	3.41	12.37	1.71	10.42	7.75	16.01	......	......	......	......	......	......	......
Average, 44 years	3.97	1.47	1.63	4.05	12.77	13.38	16.22	15.10	12.52	14.56	21.66	12.10	129.43

NOTE.—Station averages do not include records for the year 1915.

TABLE 2.—*Maximum rainfall in Canal Zone, Oct. 1, 1905, to June 30, 1915.*

[Value in inches.]

Stations.	Maximum rainfall.					
	5 minutes.		1 hour.		24 hours.[1]	
	Inches.	Date.	Inches.	Date.	Inches.	Date.
Balboa (June 10, 1906)	0.90	May 12, 1912	5.86	June 2, 1906	7.57	Nov. 16–17, 1906.
Balboa Heights (Oct. 1, 1905)[2]	.64	Aug. 7, 1908	3.98	Oct. 9, 1911	7.23	May 12–13, 1912.
Miraflores (June 19, 1914)	.45	Jan. 5, 1915	1.95	May 8, 1915	4.70	Nov. 11, 1912.[3]
Pedro Miguel (Jan. 1, 1908)	.60	Nov. 11, 1908	3.30	Aug. 27, 1908	4.64	May 25–26, 1914.
Rio Grande (Dec. 29, 1905)	.75	July 24, 1908	3.10	Sept. 21, 1912	6.00	Dec. 2–3, 1906.
Culebra (July 1, 1906)	.64	May 2, 1908	3.69	Oct. 16, 1907	5.55	Dec. 3, 1906.[4]
Empire (July 18, 1906)	.60	July 25, 1906	3.63	Oct. 1, 1909	6.15	Do.
Gamboa (Nov. 18, 1905)	.59	July 27, 1908	3.32	May 11, 1911	6.56	Dec. 2–3, 1906.
Alhajuela (Mar. 31, 1907)	.60	July 20, 1909	3.40	Dec. 28, 1909	8.19	Dec. 2–3, 1906.[4]
Frijoles (June 26, 1913)	.53	Aug. 12, 1914	2.34	Aug. 6, 1913	6.73	Apr. 3–4, 1915.
Gatun (Aug. 24, 1907)	.62	Aug. 3, 1912 Aug. 12, 1914	4.72	Aug. 12, 1914	10.48	Dec. 3, 1906.[4]
Colon (Oct. 1, 1905)	.64	Aug. 25, 1909	4.90	Oct. 8, 1909	8.53	Dec. 2–3, 1906.
Porto Bello (May 1, 1908)[5]	[6] 2.48	Nov. 29, 1911	4.53	Nov. 29, 1911	10.86	Dec. 28–29, 1909.
Bohio (Oct. 1, 1905)[7]	.67	June 16, 1909	4.51	Aug. 7, 1908	8.85	Aug. 7–8, 1908.

[1] Maximum fall in any 24 consecutive hours.

[2] Formerly Ancon. Station moved to Balboa Heights, Oct. 1, 1914.

[3] From Standard gauge reading.

[4] No automatic record on this date; total for 24 hours ending at noon.

[5] Automatic gauge discontinued May 9, 1914. Station closed Aug. 31, 1914.

[6] Approximate; automatic record indistinct, due to unusually excessive rate of fall.

[7] Station closed January, 1912.

NOTE.—Dates in parentheses opposite station names refer to installation of automatic register.

TABLE 3. *Monthly meteorological data, year 1914, Balboa Heights, Canal Zone.*[1]

Month.	Atmospheric pressure (inches).		Air temperature (° F.).							Maximum daily range.	Mean wet thermometer.	Mean temperature dew point.	Mean relative humidity.
	Station.[2]	Sea level.	Monthly mean.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.				
January	29.776	29.871	80.4	93	30	89.7	68	20	71.1	24	73	71	85
February	29.757	29.852	81.8	94	7	92.0	65	25	71.5	26	73	71	80
March	29.756	29.852	82.9	96	28	93.5	68	2	72.3	24	73	70	76
April	29.736	29.830	82.6	95	13	91.7	72	6	73.5	23	75	73	79
May	29.714	29.808	81.9	95	18	89.8	71	27	74.0	19	76	75	86
June	29.713	29.808	81.0	94	22	88.6	70	6	73.3	20	76	75	89
July	29.699	29.794	82.4	94	2	90.8	70	28	74.0	20	77	75	87
August	29.708	29.802	81.8	94	3	89.9	70	28	73.6	21	76	75	90
September	29.725	29.820	80.3	94	14	87.9	70	27	72.7	21	75	75	90
October	29.733	29.854	79.7	90	14	85.6	70	1	73.8	18	75	75	93
November	29.728	29.849	80.1	91	15	86.5	71	1	73.7	17	75	75	94
December	29.696	29.818	81.2	92	5	88.0	72	28	74.5	17	76	75	92
Year	29.728	29.830	81.3	96	[3]28	89.5	65	[4]25	73.2	26	75	73.8	86.8

Month.	Precipitation (inches).			Wind.					Number of days.				Average cloudiness.[6]
						Maximum velocity.							
	Monthly total.	Normal.[5]	Rainy days.	Total movement (miles).	Prevailing direction.	Miles per hour.	Direction.	Date.	Clear.	Part cloudy.	Cloudy.	Thunderstorms.	
January	0.32	0.95	7	6,033	NW.	23	N.	8	19	11	1	0	3.6
February	.02	.76	2	7,364	NW.	25	NW.	15	16	10	2	0	4.0
March	T.	.71	0	8,801	NW.	27	NW.	14	9	22	0	0	4.4
April	4.80	2.72	9	6,465	NW.	24	NW.	1	7	16	7	7	5.7
May	6.98	8.81	19	5,348	NW.	22	S.	13	0	8	23	10	8.0
June	7.28	8.10	21	4,649	NW.	24	N.	8	1	11	18	16	7.6
July	4.32	7.76	13	6,024	NW.	23	N.	16	8	11	12	14	6.4
August	6.09	7.49	24	5,555	NW.	35	NE.	7	0	9	22	16	8.2
September	9.60	7.80	17	4,393	NW.	22	NE.	26	0	3	27	22	9.0
October	6.44	10.53	20	4,357	NW.	27	S.	7	0	10	21	7	8.1
November	10.35	10.45	24	4,392	NW.	29	NE.	17	0	13	17	12	7.5
December	8.28	4.44	20	4,669	NW.	36	SE.	26	3	15	13	6	6.4
Year	64.48	70.52	176	68,050	NW.	36	SE.	[7]26	63	139	163	110	6.6

[1] Station formerly Ancon; moved to Balboa Heights, Oct. 1, 1914.

[2] Elevation of barometer 118 feet above sea level.

[3] March.

[4] February.

[5] Average for 17 years' record.

[6] Tenths of sky.

[7] December.

TABLE 4.—*Monthly meteorological data, year 1914, Culebra, Canal Zone.*

Month.	Atmospheric pressure (inches).		Air temperature (°F.).							Maximum daily range.	Mean wet thermometer.	Mean temperature dew point.	Mean relative humidity.
	Station.[1]	Sea level.	Monthly mean.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.				
January	29.464	29.878	78.7	90	24	86.9	67	19	70.5	22	72	71	89
February	29.456	29.869	79.6	90	3	88.1	66	24	71.2	23	72	70	84
March	29.465	29.878	80.2	92	3	88.7	69	4	71.6	22	72	70	80
April	29.445	29.856	82.3	96	9	91.5	71	28	73.1	24	74	72	82
May	29.423	29.834	81.4	94	19	89.1	71	3	73.8	22	75	74	88
June	29.415	29.828	80.0	90	27	86.9	70	6	73.0	19	75	74	94
July	29.410	29.821	81.3	93	6	88.7	70	28	73.9	18	76	75	91
August	29.418	29.830	80.4	91	30	87.1	69	28	73.6	20	75	75	94
September	...	...	...	...	...	...	...	...	...	...	...	...	...
October	...	...	...	...	...	...	...	...	...	...	...	...	...
November	...	...	...	...	...	...	...	...	...	...	...	...	...
December	...	...	...	...	...	...	...	...	...	...	...	...	...
Year	...	...	...	...	...	...	...	...	...	...	...	...	...

Month.	Precipitation (inches).			Wind.					Number of days.				Average cloudiness.[3]
						Maximum velocity.							
	Monthly total.	Normal.[2]	Rainy days.	Total movement (miles).	Prevailing direction.	Miles per hour.	Direction.	Date.	Clear.	Partly cloudy.	Cloudy.	Thunder storms.	
January	0.38	1.68	7	6,689	NW.	25	NW.	6	8	20	3	0	4.9
February	.20	.55	4	7,410	NW.	29	N.	17	7	20	1	0	4.4
March	.01	.65	1	8,776	NW.	31	N.	25	9	20	2	0	4.5
April	.62	3.54	7	6,669	NW.	26	N.	24	3	19	8	6	6.3
May	13.26	11.28	16	5,515	NW.	25	NE.	13	0	6	25	13	8.5
June	8.06	8.83	23	4,270	NW.	28	E.	18	0	4	26	19	8.8
July	5.28	9.17	14	6,164	NW.	25	NE.	23	0	13	18	16	7.9
August	9.73	10.50	22	5,694	NW.	31	NE.	28	0	5	26	21	8.6
September	11.12	11.20	25	...	...	...	...	...	...	...	...	...	...
October	8.20	11.39	23	...	...	...	...	...	...	...	...	...	...
November	7.77	12.09	22	...	...	...	...	...	...	...	...	...	...
December	4.25	7.32	13	...	...	...	...	...	...	...	...	...	...
Year	68.88	88.20	177	...	...	...	...	...	...	...	...	...	...

[1] Elevation of barometer 404 feet above sea level. [2] Average for 24 years' record. [3] Tenths of sky.

NOTE.—First-class station discontinued Sept. 12, 1914.

TABLE 5.—*Monthly meteorological data, year 1914, Colon, Republic of Panama.*

Month.	Atmospheric pressure (inches).		Air temperature (°F.).							Maximum daily range.	Mean wet thermometer.	Mean temperature dew point.	Mean relative humidity.
	Station.[1]	Sea level.	Monthly mean.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.				
January	29.896	29.907	80.7	87	10	84.4	73	29	77.0	12	75	73	81
February	29.879	29.890	80.9	86	7	84.7	73	24	77.1	12	75	73	80
March	29.886	29.898	81.3	87	2	85.2	72	5	77.4	14	75	73	80
April	29.858	29.869	81.4	88	9	85.2	73	27	77.7	12	76	75	83
May	29.832	29.843	81.7	88	21	85.5	72	7	77.9	12	78	76	86
June	29.824	29.835	80.5	88	17	84.3	74	18	76.7	11	77	76	87
July	29.822	29.834	82.0	88	3	85.4	74	15	78.5	10	78	77	86
August	29.828	29.839	81.0	88	5	84.5	74	12	77.5	11	78	77	88
September	29.822	29.834	79.4	88	21	82.7	72	26	76.1	10	77	76	89
October	29.842	29.854	79.8	91	4	84.0	73	11	75.5	15	76	75	89
November	29.824	29.850	79.9	86	2	84.0	74	1	75.8	11	77	76	88
December	29.796	29.822	81.5	89	11	85.3	75	13	77.7	11	78	77	89
Year	29.842	29.856	80.8	91	[4] 4	84.6	72	[3] 7	77.1	15	76.7	75.3	85.5

Month.	Precipitation (inches).			Wind.					Number of days.				Average cloudiness.[5]
						Maximum velocity.							
	Monthly total.	Normal.[4]	Rainy days.	Total movement (miles).	Prevailing direction.	Miles per hour.	Direction.	Date.	Clear.	Partly cloudy.	Cloudy.	Thunder storms.	
January	1.35	3.97	14	9,680	N.	32	NE.	15	13	12	6	0	4.6
February	1.32	1.47	13	10,504	N.	30	NE.	1	11	15	2	0	4.6
March	.91	1.63	13	12,779	N.	35	NE.	10	15	14	2	0	4.2
April	4.12	4.05	18	9,450	N.	30	NW.	28	10	16	4	1	4.8
May	17.76	12.77	19	8,161	N.	28	NE.	9	1	15	15	13	7.1
June	16.30	13.38	25	5,892	W.	33	W.	8	1	11	18	12	7.6
July	10.74	16.22	20	8,503	N.	26	N.	2	5	15	11	12	6.5
August	16.01	15.10	25	7,983	N.	28	W.	23	2	10	19	19	7.7
September	14.80	12.52	27	6,274	W.	27	W.	1	1	7	22	24	8.1
October	22.16	14.56	22	5,074	SE.	26	W.	15	5	9	17	20	6.9
November	18.35	21.66	23	5,287	W.	28	W.	24	5	13	12	15	6.4
December	8.88	12.10	20	8,187	NE.	29	NE.	10	6	17	8	8	5.9
Year	132.70	129.43	239	97,774	N.	35	NE.	[6] 10	75	154	136	124	6.2

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[1] Elevation of barometer 25 feet above sea level.

[2] October.

[3] May.

[4] Average for 44 years of record.

[5] Tenths of sky.

[6] March.

TABLE 6.—*Monthly evaporation, Canal Zone, years 1914 and 1915.*

[Values in inches.]

Month.	Balboa Heights.[1]			Rio Grande.			Gatun.			Colon.		
	1914	1915	Average (7 years).	1914	1915	Average (5 years).	1914	1915	Average (4 years).	1914	1915	Average (6½ years).
January	6.924	7.588	5.329	5.520	....	5.565	4.821	6.398	5.966	6.125	6.770	6.007
February	8.014	6.149	5.910	5.965	....	5.677	6.298	5.430	6.166	5.974	5.889	6.042
March	8.506	8.742	6.960	7.062	....	6.878	7.504	6.698	7.613	6.519	6.322	7.161
April	6.227	6.044	5.251	6.413	....	5.651	6.688	5.781	6.799	5.613	5.340	6.126
May	4.143	3.986	3.407	4.870	....	4.304	5.262	5.361	5.141	4.020	5.136	3.689
June	3.280	3.760	2.919	3.733	....	3.473	4.558	5.040	3.926	3.394	3.911	3.044
July	4.396	....	3.335	5.084	....	3.765	5.520	....	4.658	4.400	....	3.151
August	3.565	....	3.225	4.520	....	3.779	4.684	....	4.494	3.725	....	3.196
September	2.783	....	3.056	(2)	....	3.732	4.074	....	4.348	3.469	....	3.276
October	....	....	3.457	....	....	3.623	4.233	....	4.202	3.605	....	3.406
November	[3] 2.672	....	2.976	....	....	2.957	4.180	....	3.443	3.856	....	2.980
December	4.301	....	4.161	....	....	4.205	5.083	....	4.890	5.044	....	4.177
Year	[4] 54.811	....	49.986	....	....	53.609	62.905	....	61.646	55.774	....	52.255

[1] Formerly Ancon. Station moved to Balboa Heights Oct. 1, 1914.
[2] Station closed Sept. 12, 1914.
[3] For 29 days only.
[4] Total for 11 months.

NOTE.—Insulated tanks 10 inches in diameter at Balboa Heights and Colon. Water surface protected from action of sun and rain. Exposed pans 4 feet in diameter and 10 inches deep floating in water at Rio Grande and Gatun. For monthly evaporation during past years see previous annual reports.

TABLE 7.—*Tidal condition, year 1914.*

[Elevations in feet refer to mean sea level.]

PACIFIC COAST—BALBOA, CANAL ZONE.

Month.	Maximum high.	Date.	Extreme low.	Date.	Maximum amplitude.[1]	Date.	Minimum amplitude.[1]	Date.
January	8.9	15–16	− 8.6	15	17.5	15	6.3	6–7
February	9.6	13	− 9.8	13	19.4	13	5.4	5
March	9.9	14	−10.5	14	20.4	14	5.8	7
April	10.0	11	−10.5	11	20.5	11	6.7	4–5
May	9.6	10	− 9.4	10	19.0	10	7.3	18
June	8.7	9	− 8.3	8	16.9	9	7.1	18
July	8.7	28	− 8.2	25	16.7	27	6.0	18
August	10.0	25	− 9.0	23	18.8	24	5.6	16
September	10.3	22	− 9.4	21–22	19.7	22	5.7	15
October	10.2	20	−10.1	20	20.3	20	6.3	14
November	10.0	18	− 8.8	19	18.7	18–19	7.5	12
December	9.4	17–18	− 7.9	18	17.3	18	6.6	27
Year	10.3	Sept. 22	−10.5	Mar. 14 Apr. 11	20.5	Apr. 11	5.4	Feb. 5

[1] For consecutive tides.

ATLANTIC COAST—COLON, REPUBLIC OF PANAMA.

Month.	Maximum high.	Date.	Extreme low.	Date.	Maximum amplitude.	Date.	Minimum amplitude.	Date.
January	1.35	13	−0.42	23	1.63	24	0.21	29
February	1.36	8	− .34	18	1.48	9	.21	27
March	1.10	6–8	− .55	17	1.58	17	.21	5, 7–8
April	1.14	12	− .67	13	1.61	12, 13, 14	.23	6
May	1.42	22	− .54	13	1.78	12	.22	15
June	1.24	6	− .67	9	1.83	7–9	.20	19
July	1.37	5	− .62	6	1.99	6	.22	5
August	1.36	3	− .43	2	1.77	2	.20	13–14
September	1.39	26	− .23	26	1.57	27	.21	6, 23, 25
October	1.43	13	− .50	24	1.75	24	.22	31
November	1.40	15	− .65	20	1.92	18	.21	11
December	1.32	13	− .69	16	1.99	16	.24	11
Year	1.43	Oct. 13	− .69	Dec. 16	1.99	July 6 Dec. 16	.20	June 19 Aug. 13–14

NOTE.—One tidal fluctuation is often entirely absent at Colon.

TABLE 8.—*Seismograph records, Balboa Heights, Canal Zone, year ended June 30, 1915.*

[Latitude 8° 58′ north; longitude 79° 33′ west.]

[100 K Bosch-Omori seismographs. Greenwich mean time, midnight to midnight.]

Date.	Component.	Time of beginning.		Time of—		Maximum amplitude, millimeters.	Approximate distance of epicenter.	
		Preliminary tremors.	Long waves.	Maximum.	End.		Miles.	Probable direction.
1914.								
Aug. 17	N.-S.	11 35 00	11 35 20	11 35 30	11 39 00	1.5	115	(?)
	E.-W.	11 35 00	11 35 20	11 35 40	11 38 00	1.5	115	(?)
Sept. 22	N.-S.	18 36 45	18 37 45	18 38 50	18 48 40	4.0	328	(?)
	E.-W.	18 37 15	18 38 30	18 38 40	18 43 09	3.0	328	(?)
Oct. 1[1]	N.-S.	Record of tremors indistinct on this instrument.						
	E.-W.	7 26 44	7 28 16	7 29 44	7 34 00	2.0	440	(?)
Nov. 18	N.-S.	9 40 10	9 43 00	9 43 30	9 59 00	1.0	593	(?)
	E.-W.	9 40 15	9 42 00	9 43 50	10 00 00	2.0	593	(?)
Nov. 24	N.-S.	12 15 00	(?)	12 20 40	(?)	0.5	(?)	(?)
	E.-W.	12 12 00	(?)	12 20 40	(?)	1.0	(?)	(?)
1915.								
Jan. 13	N.-S.	10 01 45	10 02 35	10 02 55	10 09 45	0.5	294	(?)
	E.-W.	10 01 45	10 02 45	10 03 05	10 13 45	0.5	294	(?)
Jan. 23	N.-S.	4 00 35	4 00 45	4 00 46	4 01 25	6.0	69	N.
	E.-W.	4 00 35	4 00 45	4 00 46	4 01 20	8.0	69	N.
Jan. 28	N.-S.	18 35 40	18 36 40	18 36 50	18 40 55	0.5	294	(?)
	E.-W.	18 35 40	18 36 40	18 37 05	18 40 00	0.5	294	(?)
Mar. 14[2]	N.-S.	(?)	12 25 00	(?)	(?)	(?)	(?)	(?)
	E.-W.	(?)	12 25 00	(?)	(?)	(?)	(?)	(?)
Mar. 23	N.-S.[3]	9 26 20	9 27 40	9 29 35	9 34 40	1.5	385	(?)
	E.-W.	9 26 20	9 27 40	9 28 05	9 38 10	4.0	385	(?)
Apr. 23	N.-S.[3]	15 33 00	15 36 00	15 36 10	15 46 50	1.0	618	SW.
	E.-W.	15 33 00	15 36 00	15 36 00	15 48 50	2.0	618	SW.
June 6	N.-S.[3]	9 35 30	9 40 15	9 42 05	10 10 05	2.0	996	(?)
	E.-W.	9 35 15	9 40 05	9 45 40	10 09 10	5.0	996	(?)
June 17	N.-S.	5 33 13	5 34 13	5 34 28	5 41 38	3.0	306	SW.
	E.-W.	5 33 18	5 34 23	5 34 38	5 40 00	3.0	306	SW.
June 28	N.-S.	8 27 16	8 27 31	8 27 31	8 29 26	10.0	91	SE.
	E.-W.	8 27 57	8 28 12	8 28 12	8 29 31	13.0	91	SE.

[1] 25 K instruments, magnification 8.

[2] No record on instruments, seismograph room being painted.

[3] 25 K component substituted. 100 K N-S. instrument broken by painter.

NOTE.—Station formerly Ancon, moved to Balboa Heights, Oct. 1, 1914. Period of pendulum, 25 seconds; magnification, 10; damping medium. The amplitude indicates half of the complete range of maximum motion. Laska's formula used in computing distances of remote earthquakes (620 miles or more), and Omori's formula for earthquakes less than 620 miles distant.

HYDROGRAPHY.

GENERAL.

The important feature of the year was the advent of Gatun Lake and the canal as an international waterway. During the period between September 26, 1913, and August 15, 1914, there was some shifting of floating equipment, and several sugar barges and rafts of piles were locked through the locks. On August 15, 1914, the canal was opened for commercial use; Gatun Lake was at elevation 85 at that time. It was raised to 86 between September 12 and 17, to 86.70 between November 17 and 22, and to 87 between December 12 and 13; during the whole wet season almost daily spillway gate operation was necessary to maintain the level desired. During March, 1915, the evaporation and other losses so exceeded the yield as to lower the lake to 86.60 or 0.4 of a foot. On April 3 and 4, 1915, the lake was lowered to 85.50. On June 28, 1915, the spillway was closed and the lake was at 85.96 on July 1, 1915. Little difficulty was experienced in controlling the lake levels within a variation of 0.1 foot by the operation of not more than five spillway gates.

It was expected that, owing to the hydroelectric plant using about three times the amount of water allowed for in the original estimates, there would be a deficit during the dry-season months of 1915. However, the lake actually lost but 0.4 of a foot. The spillway discharges from the freshets of February 9, 10, and 11, 1915, and April 3-4, 1915, alone, had they been stored, would have raised the lake from 87 to 89.95.

Owing to Gatun Lake conditions not being comparable with conditions previous to 1914, in matters of evaporation, seepage, retention in swamps, and rainfall direct into the lake, it has become necessary to start a new era of average net and total yields, beginning January, 1914. For this reason no reliable Gatun Lake average long-term yields will be available for some time.

The run-off at Alhajuela for the year 1914 was 10 per cent below the 25-year average, and for the dry season 1915, 30 per cent above the 26-year dry season average. See Tables Nos. 13 and 14 and plate No. 82.

Plate No. 81 gives the total yield, net yield, land-area yield, useful outflow, storage, rainfall on the lake yield, and evaporation, massed, for the Gatun Lake watershed for the year 1914 and the dry season of 1915. The total yield for 1914 was 102 per cent of the capacity of the lake at elevation 85. The water losses in the lake due to lockages, leakage, power, and pumping have considerably increased during the period January to April, inclusive, 1915, over that of any similar length period of 1914. This is due to the fact that one turbine ran from June 1, 1914, whereas three have been taking water since December 29, 1914. The individual high item in water losses due to useful outflow is for hydroelectric power. The ratio between lockage and power water losses varies as 1 to 2.23 during the dry season of 1915. During the total period of lockages, September 13, 1913, to July 1, 1915, there have been lockages as follows:

Gatun locks	1,325
Pedro Miguel locks	1,330
Miraflores locks	1,317

Tables Nos. 9 and 10 give the hydrology of Gatun Lake watershed for the year 1914 and the dry season 1915, respectively. In like manner Tables Nos. 11 and 12 cover the Miraflores Lake hydrology.

Plates Nos. 85, 86, 87, and 88 cover January, February, March, and April, 1915, studies of Gatun Lake heights, respectively. Table No. 17 gives the monthly Gatun and Miraflores Lakes and Chagres River heights for the year 1914. Table 15 gives 1914 monthly discharges at Alhajuela and various data on Gatun Lake.

Plate No. 91 gives the 25-year average (1890–1914, inclusive) discharge duration by months for Chagres River at Alhajuela.

There were no large freshets during the year, the largest two being those of October 7, 1914, and April 3, 1915, at 31,650 and 27,085 c. f. s., respectively, at Alhajuela. Table No. 16 gives the data on the principal freshets. While there were no large freshets in 1914, there were an unusual number of good runs of water well distributed over the wet season. Plate No. 90 gives slope data for past seven years as it has changed, due to lake elevations. The northers of February 9, 10, 11, and April 3, 4, 1915, which did so much damage in Limon Bay, resulted in heavy rainfall over the northern end of Gatun Lake watershed, and gave record yields for those months. All freshets have been handled by the operation of not over five spillway gates, except on October 7, 1914, when six were run for 4 hours 22 minutes, with a maximum discharge of 70,850 c. f. s.

GATUN.

The current meter gaugings at the Gatun spillway gauging station were continued to January 15, 1915. This series of 43 gaugings was begun on December 31, 1913, and taken during spillway discharge at various heights of the Gatun Lake. Average values of the constant in Francis's formula $C=\frac{Q}{LH^{3/2}}$, and the rectangular opening formula $C^1=\frac{Q}{LH\sqrt{2gH}}$, have been calculated from the measured discharges between elevations 84 and 87; a rating curve and table have been prepared. C in Francis's formula at elevation 87 is 3.77; the designing engineer used $C=3$ in providing a spillway area for passing 144,000 c. f. s. with 14 gates, elevation 87. The true total discharge is $\frac{3.77}{3.00}\times 144{,}000$, or very nearly 181,000 c. f. s., with Gatun Lake at 87. At elevation 85 the ordinary wet season lake height $C=3.60$, and the discharge of 14 gates is 146,500 c. f. s.

ALHAJUELA.

Ninety-eight current-meter measurements were made on the main river at the Calle Larga gauging station during 1914 and 34 were made in 1915 up to July 1, covering elevations 103.10 to 90.91, inclusive. Seven check gaugings were made in 1914 and three in 1915 of the upper tributaries at Dos Bocas (the forks of the Chagres), covering the discharge from the La Puente, the Pequeni, and the Chagres branches. The results have been satisfactory. The Calle Larga cross section taken January 21, 1915, showed minor changes, and a new discharge curve and table were prepared.

Alhajuela and Vigia have been continued as flood-warning stations.

CANAL CURRENT VELOCITIES.

Miraflores Locks.—Surface current velocities at 1 and 2 foot depths, at high and low tide, were measured in the middle of the channel at the lower west operating gate at Miraflores Locks on May 31, 1915. These velocities are due to the intermixing of the salt and fresh water at the opening of the gates. Plate No. 84 gives the results of gaugings. This test was supplementary to those of April, 1914, mentioned in the 1914 Annual Report of The Panama Canal. The maxima velocities of 6.1 and 4.4 feet per second at high and low tides of +8 and −7, respectively, are considerably higher than the velocity of 2.75 feet per second obtained at mean tide in the April, 1914, tests, for the reason that the water in the lower level of the lock was freshened by a second filling from the upper level. Conditions were thus nearer the theoretical ratio of 1.02 to 1 of the specific gravities of salt and fresh water. In the more recent test the current meter was located 55 feet nearer the pintle line of the gate leaves, thus catching the first rush of the water on the opening of the leaves.

Gamboa Bridge.—The following data on maximum current velocities, due to Chagres River freshets, have been obtained by current meter measurements taken at 1-foot depths at Gamboa Bridge:

Date.	Discharge in c. f. s.		Gatun Lake elevation.	Current velocity in—		
	Alhajuela.	Gatun spillway.		Feet per second.	Miles per hour.	Knots.
May 26, 1914	15,900	10,390	84.92	0.95	0.65	0.56
June 30, 1914	20,050	41,380	84.88	1.54	1.05	.91
July 28, 1914	25,300	30,972	84.86	1.83	1.24	1.08
Aug. 22, 1914	21,600	20,905	84.97	1.61	1.10	.95
Sept. 7, 1914	28,665	52,265	84.97	2.11	1.43	1.24
Oct. 7, 1914	31,200	70,680	86.10	2.11	1.43	1.24
Apr. 3, 1915	27,085	63,895	86.67	1.74	1.19	1.03

The currents are at right angles to the Panama Canal channel, the bridge being just north of the east bank of the canal. The back water of this arm of the lake extends about 8 miles above Gamboa Bridge.

Currents in Gatun Lake due to spillway operations.—Current-meter measurements were made on May 7, 8, and 9, 1915, in order to determine the amount of currents set up in the canal when four or five spillway gates are in simultaneous operation. Results obtained are as follows:

Place and time.	Gates open.	Depth of meter.	Direction and velocity of wind at Gatun.	Velocity in—		
				Feet per second.	Feet per hour.	Knots.
		Feet.				
(1) 150 feet east of spar buoy No. 2: May 7, 1.32 to 2.11 p. m.	Nos. 13, 14, 7, 1, and 2.	1	Max. SW., 12.	0.35	1,260	0.21
		15	Min. S., 9	.31	1,116	.19
(2) 200 feet east of buoy No. 4: 2.32 to 2.48 p. m.	do.	1	S., 7	.29	1,044	.17
		15		.18	648	.11
(3) Spar buoy No. 3, near dam: 3.15 to 3.33 p. m.	do.	1	Max. S., 10	.44	1,584	.26
		15	Min. S., 5	.48	1,728	.28
(4) Bohio Narrows: May 8, 10.05 to 10.39 a. m.	Nos. 8, 9, 10, and 11	1	SE., 9	.56	2,016	.33
		10		.38	1,368	.23
		20		.41	1,476	.24
		1		.57	2,052	.34
(5) Tiger Hill Narrows: 11.46 a. m. to 12.10 p. m.	do.	1	SE., 5	.38	1,368	.23
		10		0	0	....
		20		0	0	....
		1		.30	1,080	.18
(1) 150 feet east of spar buoy No. 2: May 9, 10.45 to 11 a. m.	Nos. 7, 8, 9, and 10	15	S., 4	.25	900	.15
		10		.45	1,620	.27
		5		.36	1,296	.21

The arrangement of gates open on the 7th was expected to give minimum current in the canal near buoy No. 2, owing to the arc shape of the spillway and the position of Guarapo Island. The arrangement of gates open on the 9th was intended to give the maximum current at buoy No. 2, possible with four gates open.

Local topography at Bohio would seem to be the explanation of the comparative considerable current there, the width between the two islands being 1,200 feet.

Currents about upper approach wall, Gatun Locks, during spillway operations.—Current meter gaugings made at points mentioned below about upper approach wall, Gatun Locks, on May 26, 1915, gave results as below. These gaugings were made at the request of the acting marine superintendent, Commander Butler. It is believed that the spillway gates open, Nos. 6, 7, 8, 9, and 10, are so located as to give the greatest current effect, at Gatun Locks, possible for five gates.

Place and time.	Depth of meter.	Direction and velocity of wind in—		Current velocity in—		
		Miles per hour.	Knots.	Feet per second.	Feet per hour.	Knots.
Gatun Locks 300 feet north of east forebay:	*Feet.*					
8.25 to 8.50 p. m.	5	SE., 21	18¼	0.99	3,565	0.58
Do	10	SE., 18	15¾	.93	3,350	.55
Do	15	ESE., 17	14¾	.79	2,845	.47
9.22 p. m.	10	E., 11	9½	.57	2,050	.34
9.25 p. m.	20	E., 11	9½	.66	2,375	.39
9.55 p. m.	10	SE., 10	8¾	.46	1,655	.27
10.09 p. m.	5	E., 10	8¾	.42	1,510	.25
10.15 p. m.	10	E., 7	6	.42	1,510	.25
10.20 p. m.	20	E., 8	7	.44	1,585	.26
10.23 p. m.	5	E., 8	7	.42	1,510	.25
Gatun Locks end of approach wall:						
11.00 p. m.	15	SE., 10	8¾	.39	1,405	.23
11.02 p. m.	20	SE., 9	7¾	.39	1,405	.23
11.03 p. m.	10	SE., 9	7¾	.46	1,655	.27
11.05 p. m.	5	SE., 8	7	.37	1,330	.22
Gatun Locks 300 feet north of west forebay:						
11.13 p. m.	5	SE., 8	7	.33	1,190	.19
11.16 p. m.	10	SE., 8	7	.28	1,010	.17
11.20 p. m.	15	SE., 7	6	.19	685	.11
11.22 p. m.	20	SE., 7	6	.26	935	.15
11.24 p. m.	15	SE., 7	6	.22	790	.13

It may be noted that the wind direction was toward the spillway, and that the current velocity slowed down with the wind. It is probable that the highest current velocity was helped by the gale, which reached its maximum of SE. 25 miles an hour, or 21¾ knots, at 8.15 p. m.

During the gauging period the lake fell from elevation 85.54 to 85.45. This was partially due to the decrease in wind velocity, the lake elevation having jumped up 0.15 foot in a few minutes during the maximum wind velocity.

Currents in Gaillard Cut during Pedro Miguel lockages.—On December 4, 1914, current meter measurement at 1-foot depth was made in narrowest part of Gaillard Cut at the slide at station 1791+25 to determine the velocity and behavior of the current due to the opening of the valves at Pedro Miguel Lock. The pontoon bridge at Paraiso was open, and dredges and barges were the only vessels in the Cut. The wind was blowing northwest 8 miles per hour.

Plate No. 92 shows the results obtained. The maximum velocity was 1.36 feet per second or 0.9 mile per hour toward Pedro Miguel.

Time duration of Pedro Miguel lockage effects in Gatun Lake.—On November 7, 1914, a test was made to find the time interval and height from the trough to crest of waves at Pedro Miguel, Gamboa, and Juan Mina. These waves are caused by the opening of the upper valves at Pedro Miguel Lock.

The water stage registers at Pedro Miguel, Gamboa, and Juan Mina were set to the minute at 7.15 a. m. to insure correct timing. The scale on the automatic records was increased to 1 to 5, so as to give accurate heights.

Below is the record made during the lockage of the steamship *American Transport*, northbound. The Pedro Miguel lock valves at the west chamber were wide open, the Paraiso pontoon bridge was open and no vessels except the regular dredging fleet were in Gaillard Cut. This record is typical under normal working conditions:

	Pedro Miguel Lock.		Gamboa.		Juan Mina.	
	Time.	Lake elevation.	Time.	Lake elevation.	Time.	Lake elevation.
Valves opened	11.40 a.m.	85.94	12.01 p.m.	85.95	12.25 p.m.	85.94
Trough of wave	11.45 a.m.	85.23	12.05 p.m.	85.82	12.30 p.m.	85.90
Crest of return wave	12.30 p.m.	86.60	12.45 p.m.	85.98	1.15 p.m.	86.00
Wind, northwest, 6 miles per hour	11.40 a.m.		12.01 p.m.[1]			
Wind, northwest, 10 miles per hour	12.30 p.m.		12.45 p.m.[2]			

[1] Wind, northwest, 9 miles per hour.

[2] Wind, west, 8 miles per hour.

LEAKAGES—LOCKS AND SPILLWAYS.

The leakages of valves in the locks have been found to vary considerably at various times, due to obstructions catching under or at the sides. This division made a number of gaugings and weir measurements at Gatun Locks during July and August, 1914, in order to check the leakage found by the testing engineers at Gatun and the Pacific Locks. In September, 1914, further work was done by the lock superintendents in observing the fall of the water in a chamber during the night. This leakage was from both valves and lock gates. These tests, together with those on Gatun spillway, described in last year's annual report, have resulted in the use of the following coefficients in the leakage calculations of the lakes' hydrologies:

	C. f. s.
Gatun Locks	5.93
Gatun spillway	3.64
Pedro Miguel Lock	4.99
Miraflores Locks	5.30
Miraflores spillway	.86

These coefficients are increased when usual leakage conditions obtain, such as when spillway or lock caissons are in use.

MISCELLANEOUS.

Various estimates have been made during the year on time taken for raising or lowering the lake to stated heights.

A current meter car rating station was established in July, 1914, at the Pedro Miguel Pond. This station is well located for satisfactory results. Fourteen ratings have been made at this location and all meters are now in good condition. A Haskell-Richie current velocity and direction meter is now under order for special current investigations.

The flow through the north Venturi meter in the Miraflores filtration plant was checked by the measurement of the flow over the municipal division's three-panel rectangular weir, and report made to the municipal engineer.

The usual maintenance work on the various stations has been done. No change in station locations has been made over last year.

The following tables and diagrams accompany the hydrographical section of this report:

Plate No. 81. Yields, storage, and losses mass curves, Gatun Lake watershed.
Plate No. 82. Alhajuela average monthly discharges.
Plate No. 83. Total yield of Gatun Lake, 1914, and dry season, 1915.
Plate No. 84. Current-velocity observations, Miraflores Locks.
Plate No. 85. Study of Gatun Lake Heights, January, 1915.
Plate No. 86. Study of Gatun Lake Heights, February, 1915.
Plate No. 87. Study of Gatun Lake Heights, March, 1915.
Plate No. 88. Study of Gatun Lake Heights, April, 1915.
Plate No. 89. Alhajuela mass curves.
Plate No. 90. Ratio curves, Vigia to Gamboa rise.
Plate No. 91. Alhajuela discharge duration curve.
Plate No. 92. Surge in Gaillard Cut due to Pedro Miguel lockage.
Table No. 9. Hydrology of Gatun Lake watershed, 1914.
Table No. 10. Hydrology of Gatun Lake watershed, dry season, 1915.
Table No. 11. Hydrology of Miraflores Lake watershed, 1914.
Table No. 12. Hydrology of Miraflores Lake watershed, dry season, 1915.
Table No. 13. Hydrology of Chagres, 1914.

Table No. 14. Hydrology of Chagres, dry season, 1915.
Table No. 15. Monthly 1914 Alhajuela discharge, Gatun Lake hydrology, 1914.
Table No. 16. Principal freshets of 1914 and dry season 1915.
Table No. 17. Maximum, minimum, and mean elevations, by months, at all stations from January to December, inclusive, 1914.

TABLE 9.—*Hydrology of Gatun Lake watershed, 1914.*

[Drainage area, 1,320 square miles.]

	Elevation.	Date.
Gatun Lake:		
Yearly mean	85.26	
Maximum	87.07	Dec. 24–27
Minimum	84.13	Jan. 6

	Quantities.	
	Million cubic feet.	Second-feet.
Gatun spillway:		
Waste	139,285	4,416.7
Leakage	574	18.2
Gatun locks:		
Lockage and tests	2,501	79.3
Leakage	151	4.8
Gatun hydroelectric plant	3,604	114.3
Pedro Miguel locks:		
Lockage and tests[1]	2,681	85.0
Leakage[1]	104	3.3
Pumping at Cucaracha slide[1]	265	8.4
Brazos Brook Reservoir	208	6.6
Pumping at Pedro Miguel[1]	189	6.0
(*a*) Total outflow	149,562	4,742.6
(*b*) Storage (+ increase, − decrease)	+12,154	+385.4
(*c*) Net yield (*a*+*b*)	161,716	5,128.0
(*d*) Evaporation on lake (62.89 inches)	23,970	760.1
(*e*) Total yield (*c*+*d*)	185,686	5,888.1
(*f*) Rainfall on lake (92.08 inches)	35,040	1,111.1
(*g*) Yield from lake area (*e*−*f*)	150,646	4,777.0

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage run-off.
Lake surface	164.0	92.08	92.08	100.00
Land area	1,156.0	101.76	56.09	55.19
Total watershed	1,320.0	100.54	60.55	60.24

[1] Into Miraflores Lake.

TABLE 10.—*Hydrology of Gatun Lake watershed, dry season, 1915.*[1]

[Drainage area, 1,320 square miles. 491 Pedro Miguel lockages. 492 Gatun lockages.]

	Elevation.	Date.
Gatun Lake:		
Dry season mean	86.81	
Maximum	87.20	Feb. 10
Minimum	86.37	Apr. 24

[1] Dry season months are January, February, March, and April.

TABLE 10.—*Hydrology of Gatun Lake watershed, dry season, 1915*—Continued.

	Quantities.	
	Million cubic feet.	Second-feet.
Gatun spillway:		
Waste	23,263.5	2,243.8
Leakage	37.7	3.6
Gatun locks:		
Lockage and tests	1,980.2	191.0
Leakage	61.5	5.9
Gatun hydroelectric plant	8,311.8	801.7
Pedro Miguel Locks:		
Lockage and tests [1]	1,744.4	168.2
Leakage [1]	75.2	7.3
Pumping at Cucaracha slide [1]	97.0	9.4
Brazos Brook Reservoir	118.0	11.4
Pumping at Gamboa	64.2	6.2
(*a*) Total outflow	35,753.5	3,448.5
(*b*) Storage (+increase, — decrease)	−1,257.0	−121.2
(*c*) Net yield (*a*+*b*)	34,496.5	3,327.3
(*d*) Evaporation on lake (24.31 inches)	9,427.5	909.3
(*e*) Total yield (*c*+*d*)	43,924.0	4,236.6
(*f*) Rainfall on lake (21.91 inches)	8,492.0	819.1
(*g*) Yield from land area (*e*—*f*)	35,432.0	3,417.5

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage run-off.
Lake surface	166.9	21.9	21.9	100.0
Land area	1,153.1	19.2	13.2	69.0
Total watershed	1,320.0	19.6	14.3	73.0

[1] Into Miraflores Lake.

TABLE 11.—*Hydrology of Miraflores Lake watershed, 1914.*

[Drainage area, 38.5 square miles.]

	Elevation.	Date.
Miraflores Lake:		
Yearly mean	52.21	....
Maximum	54.40	Nov. 16
Minimum	42.49	Apr. 13

	Quantities.	
	Million cubic feet.	Second-feet.
Miraflores spillway:		
Waste	1,710.8	54.22
Leakage	544.7	17.27
Miraflores Locks:		
Lockages and tests	2,167.2	68.72
Leakage	135.7	4.31
Miraflores filter plant	259.9	8.24
Miraflores power plant	293.8	9.31
(*a*) Total outflow	5,112.1	162.10
Total inflow from Gatun Lake [1]	+3,241.6	+102.79
(*b*) Storage (+ increase, — decrease)	+ 153.3	+ 4.86
(*c*) Net yield (*a* [1] ± *b*)	2,025.8	64.23
(*d*) Evaporation on lake (57.67 inches)	198.2	6.28
(*e*) Total yield (*c* + *d*)	2,227.6	70.64
(*f*) Rainfall on lake (70.27 inches)	252.1	8.00
(*g*) Yield from land area (*e*—*f*)	1,975.5	62.64

[1] Includes Miraflores filter plant wash water.

TABLE 11.—*Hydrology of Miraflores Lake watershed, 1914*—Continued.

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage run-off.
Lake surface	1.51	70.27	70.27	100.0
Land area	36.99	69.81	22.81	32.80
Total watershed	38.5	69.80	24.82	35.60

TABLE 12.—*Hydrology of Miraflores Lake watershed, dry season, 1915.*[1]

[Drainage area, 38.5 square miles. 481 Miraflores lockages.]

	Elevation.	Date.
Miraflores Lake:		
Dry season mean	53.91	....
Maximum	54.43	Mar. 14 & 22
Minimum	53.43	Jan. 21

	Quantities.	
	Million cubic feet.	Second-feet.
Miraflores spillway:		
Waste	0.0	0.0
Leakage	8.9	.9
Miraflores Locks:		
Lockage and tests	1,657.2	159.8
Leakage	117.4	11.3
Miraflores filter plant	20.7	2.0
Miraflores power plant	296.3	28.6
(*a*) Total outflow	2,100.5	202.6
Total inflow from Gatun Lake [2]	+1,922.7	+185.4
(*b*) Storage (+ increase, — decrease)	— 5.0	— .5
(*c*) Net yield (*a* —[2] ± *b*)	172.8	16.7
(*d*) Evaporation on lake (23.90 inches)	88.9	8.6
(*e*) Total yield (*c* + *d*)	261.7	25.3
(*f*) Rainfall on lake (5.56 inches)	20.6	2.0
(*g*) Yield from land area (*e* — *f*)	241.1	23.3

	Mean area (square miles).	Rainfall (inches).	Run-off (inches).	Percentage run-off.
Lake surface	1.6	5.56	5.56	100.0
Land area	36.9	6.71	2.80	42.0
Total watershed	38.5	6.66	2.93	44.0

[1] Dry season months are January, February, March, and April.

[2] Includes Miraflores filter plant wash water, 6.1 million cubic feet, 0.6 second-foot.

TABLE NO. 13.—*Hydrology of Chagres, 1914.*

[Elevations are in feet above sea level and quantities in second-feet.]

[Alhajuela. Drainage area, 427 square miles.]

Low water (feet above mean sea level)	91.0
Distance from Gatun (miles)	38.5
Mean:	
Elevation (feet above mean sea level)	92.85
Discharge	2,269

Maximum:	
Day of month, Oct. 7.	
Elevation (feet above mean sea level)	103.10
Discharge	31,650
Minimum:	
Day of month, Apr. 14, 15, 16, 17, 18.	
Elevation (feet above mean sea level)	90.90
Discharge	305
Percentage of yield at Gatun	[1] 44 [2] 39
Length of record, 25 years.	
Compared with station average (total period) per cent below	10

TABLE NO. 14.—*Hydrology of Chagres, dry season, 1915.*[3]

[Elevations are in feet above sea level and quantities in second-feet.]

[Alhajuela. Drainage area, 427 square miles.]

Low water (feet above mean sea level)	91.0
Distance from Gatun (miles)	38.5
Mean:	
Elevation (feet above mean sea level)	92.51
Discharge	1,707
Maximum:	
Day of month, Apr. 3.	
Elevation (feet above mean sea level)	102.35
Discharge	27,085
Minimum:	
Day of month, Apr. 1.	
Elevation (feet above mean sea level)	91.47
Discharge	545
Percentage of yield at Gatun	[1] 51 [2] 40
Length of record, 26 years.	
Compared with station average (same season) per cent above	30

TABLE 15.—*Monthly discharge, Chagres River, 1914.*

[Alhajuela. Drainage area, 427 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on watershed).
	Maximum.	Minimum.	Mean.	Per square mile.	
January	2,255	830	1,306	3.06	3.528
February	1,175	670	824	1.93	2.010
March	640	401	530	1.24	1.430
April	1,730	305	469	1.10	1.227
May	23,680	359	2,049	4.80	5.534
June	20,050	1,082	2,084	4.88	5.445
July	25,600	785	1,399	3.28	3.781
August	21,980	818	2,066	4.84	5.580
September	28,820	1,926	4,334	10.15	11.325
October	31,650	2,600	5,135	12.03	13.869
November	19,500	2,306	3,804	8.91	9.941
December	23,690	2,058	3,213	7.52	8.670
The year	31,650	305	2,269	5.31	6.028

[1] Compared with Gatun net yield.
[2] Compared with Gatun total yield.
[3] Dry season months are January, February, March, and April.

TABLE 15.—*Monthly discharge, Chagres River, 1914*—Continued.

[Gatun Lake. Drainage area, 1,320 square miles.]

1 Month.	2 Mean elevation above mean sea level.	3 Area for mean elevation.	4 Spillway discharge.[1]	5 Storage (+increase, −decrease).	6 Evaporation from lake surface.	7 Run-off net yield (4+5).	8 Total yield (4+5+6).
	Feet.	*Sq. mi.*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
January	84.54	162.6	1,026	+ 713	680	1,739	2,419
February	84.86	163.0	930	− 186	987	744	1,731
March	84.82	162.9	148	+ 19	1,062	167	1,229
April	84.82	162.9	169	+ 139	974	308	1,282
May	84.81	162.8	3,353	− 134	743	3,219	3,962
June	84.85	162.9	5,715	+ 69	665	5,784	6,449
July	84.78	162.8	1,898	0	780	1,898	2,678
August	84.93	163.1	4,741	+ 179	664	4,920	5,584
September	85.57	164.8	7,530	+2,311	602	9,841	10,443
October	86.01	165.6	14,938	− 187	608	14,752	15,360
November	86.26	166.0	9,925	+1,229	621	11,153	11,775
December	86.87	167.0	6,538	+ 472	736	7,010	7,747
The year	85.26	163.8	4,743	+ 385	760	5,128	5,888

[1] Includes leakages, lockages, pumping, and power.

TABLE 16.—*Principal freshets of year 1914, and dry season, 1915.*

Date of beginning.	Vigia.		Alhajuela.				Gamboa.				
	Elevation of crest.	Rise.	Elevation of crest.	Rise.	Hours after Vigia.	Maximum discharge.	Elevation of crest.	Rise.	Hours after Vigia.	Per cent of Vigia. rise.	Per cent of Alhajuela rise.
1914.		*Feet.*		*Feet.*		*Cu. ft.-sec.*		*Feet.*			
May 21	138.2	11.7	101.0	7.9	1	23,680	84.62	0.13	2½	1.1	1.6
June 30	136.8	11.2	100.0	7.8	1¼	20,050	85.00	.10	1¾	.9	1.5
July 28	138.6	13.2	101.4	9.6	1	25,600	84.97	.20	3⅔	1.5	2.1
Aug. 22	137.2	11.0	100.4	7.7	1	21,980	85.07	.11	¾	1.0	1.4
Sept. 7	140.2	13.5	102.4	9.2	1½	28,820	85.15	.18	3	1.3	2.0
Sept. 24	137.0	9.6	100.2	6.6	1¼	21,100	86.15	.17	1¾	1.8	2.6
Oct. 7	140.9	13.4	103.1	9.4	1¼	31,650	86.18	.19	1¼	1.4	2.0
Oct. 11	138.0	10.3	101.2	7.4	1½	24,220	86.13	.13	1	1.2	1.8
Oct. 15	136.2	8.6	100.0	6.2	1¼	20,200	86.19	.19	....	2.2	3.1
Oct. 16	136.8	7.8	100.2	5.4	1	21,100	85.98	.06	1¾	.8	1.1
Dec. 12	137.9	10.6	101.0	7.2	1	23,690	86.94	.21	3¼	2.0	2.8
Dec. 24	137.3	9.7	100.2	6.6	1¼	20,700	87.10	.12	2	1.2	1.8
1915.											
Feb. 10	137.4	7.8	100.1	5.8	1¼	20,308	87.19	.05	....	.6	.9
Apr. 3	140.6	15.2	102.4	10.8	1¼	27,100	86.82	None.	....	0	0
Apr. 4	139.6	8.8	102.0	6.0	1¼	26,000	86.73	.07	....	.8	1.2

TABLE 17.—*Monthly maximum, minimum, and mean elevations, Gatun Lake, Miraflores Lake, and Chagres River, 1914.*

	Gatun Lake.								
	Gatun.			Trinidad.			Monte Lirio.		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	84.90	84.13	84.54	84.89	84.12	84.52	....	....	....
February	85.00	84.72	84.86	84.96	84.74	84.84	....	....	....
March	84.89	84.73	84.82	84.87	84.72	84.81	....	....	....
April	84.89	84.77	84.82	84.86	84.74	84.79	....	....	....
May	85.10	84.38	84.81	85.08	84.40	84.77	[1] 85.10	84.41	84.80
June	85.14	84.68	84.85	85.01	84.64	84.82	85.06	84.67	84.81
July	84.98	84.54	84.78	84.92	84.50	84.74	84.96	84.52	84.78
August	85.06	84.78	84.93	85.05	84.75	84.88	85.17	84.81	84.95
September	86.17	84.82	85.57	86.09	84.84	85.48	86.18	84.91	85.48
October	86.20	85.90	86.01	86.13	85.81	85.95	86.20	85.88	86.02
November	86.74	85.91	86.26	86.75	85.89	86.21	86.81	85.93	86.27
December	87.07	86.66	86.87	87.05	86.54	86.82	87.09	86.59	86.88
Year	87.07	84.13	85.26	87.05	84.12	85.22	[2] 87.09	....	....

	Gatun Lake.								
	Bohio.			Frijoles.			San Pablo.		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	84.92	84.16	84.56	84.91	84.14	84.54	84.95	84.15	84.56
February	85.01	84.79	84.89	85.00	84.74	84.87	85.01	84.75	84.88
March	84.90	84.78	84.85	84.86	84.75	84.81	84.92	84.79	84.84
April	84.90	84.79	84.84	84.90	84.75	84.81	84.90	84.78	84.84
May	85.12	84.44	84.78	85.10	84.42	84.75	85.10	84.42	84.77
June	85.09	84.69	84.87	85.04	84.67	84.85	85.03	84.69	84.85
July	84.96	84.58	84.79	84.97	84.56	84.79	84.97	84.56	84.78
August	85.18	84.83	84.94	85.12	84.80	84.92	85.17	84.83	84.92
September	86.14	84.91	85.53	86.16	84.92	85.55	86.12	84.88	85.52
October	86.15	85.85	85.99	86.18	85.87	85.97	86.13	85.84	85.99
November	86.74	85.94	86.27	86.76	85.92	86.26	86.75	85.91	86.24
December	87.12	86.59	86.90	87.09	86.59	86.87	87.10	86.57	86.86
Year	87.12	84.16	85.27	87.09	84.14	85.25	87.10	84.15	85.25

	Gatun Lake.								
	Gamboa.			Pedro Miguel.			Juan Mina.		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	84.91	84.03	84.50	85.08	83.95	84.51	....	....	....
February	84.97	84.70	84.84	85.78	83.87	84.85	....	....	....
March	84.87	84.73	84.80	85.37	84.22	84.80	....	....	....
April	84.92	84.66	84.79	85.45	84.10	84.79	....	....	....
May	85.08	84.31	84.75	85.46	83.82	84.80	85.11	84.30	84.73
June	85.01	84.53	84.79	85.64	84.00	84.81	85.30	84.57	84.78
July	85.00	84.39	84.75	85.54	83.77	84.75	85.59	84.42	84.71
August	85.16	84.65	84.92	85.75	84.01	84.90	85.41	84.75	84.93
September	86.15	84.78	85.51	86.87	84.17	85.48	86.49	84.90	85.55
October	86.19	85.69	85.96	86.85	84.82	85.95	87.23	85.80	86.02
November	86.82	85.75	86.21	87.47	84.84	86.20	86.93	85.88	86.25
December	87.12	86.45	86.84	87.79	85.70	86.82	87.33	86.53	86.87
Year	87.12	84.03	85.22	87.79	83.77	85.22	[2] 87.33	....	....

---

[1] 29 days.

[2] 8 months.

TABLE 17.—*Monthly maximum, minimum, and mean elevations, Gatun Lake, Miraflores Lake, and Chagres River, 1914*—Continued.

	Chagres River.						Miraflores Lake.		
	Alhajuela.			Vigia.			South end Pedro Miguel Lock.		
	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.	Maximum.	Minimum.	Mean.
January	93.15	91.80	92.30	126.65	125.30	125.77	51.11	50.08	50.67
February	92.18	91.43	91.69	125.60	125.00	125.21	52.61	50.76	51.79
March	91.43	91.06	91.26	125.00	124.70	124.82	52.01	50.07	50.98
April	92.75	90.90	91.16	126.25	124.55	124.76	50.12	42.49	46.08
May	101.00	90.99	92.71	138.20	124.60	126.30	51.90	47.56	50.91
June	99.95	92.08	92.93	136.90	125.60	126.47	54.22	50.74	52.83
July	101.55	91.65	92.29	138.50	125.20	125.87	54.14	53.08	53.67
August	100.40	91.68	92.86	137.30	125.15	126.53	54.19	53.45	53.87
September	102.45	92.88	94.34	140.20	126.35	128.39	54.31	52.91	53.80
October	103.10	93.40	94.73	140.90	127.05	128.90	54.30	53.56	53.99
November	99.70	93.19	94.08	135.95	127.10	128.13	54.40	53.62	53.98
December	101.00	92.99	93.79	137.90	127.00	128.07	54.24	53.61	53.90
Year	103.10	90.90	92.85	140.90	124.55	126.60	54.40	42.49	52.21

SECTION OF SURVEYS.

O. E. Malsbury, assistant engineer.

This section of my office continued its work of maintaining, checking, and recording the locations of Canal Zone boundary monuments, triangulation points, and bench marks. It has handled all survey work in connection with the permanent locations of buildings, sewer and water lines, staking out and checking up all changes in the alignment of permanent and construction tracks on the locks and dams, and has made various routine surveys, maps, plats, topography layouts for other divisions.

At Gatun Dam a continuous record is taken of bench-mark locations, no unusual settlement occurring during the year.

During the year this section accomplished the following "line" work:

	Miles.
Transit	66.53
Y level	233.09
Precise level	63.66
Stadia traverse	49.79
Stadia side shots	65.24
Clearing	1.85
Hand level	5.52
Total	485.68

SECTION OF OFFICE ENGINEER.

C. J. Embree, office engineer.

On September 21, 1914, the section of office engineer was reorganized, centralizing the drafting forces of lock operation and maintenance, electrical division, municipal engineering division, division of terminal construction (including permanent shops, coaling plants, dry docks, oil terminals, and wharves) and the building division.

The drafting force has been assigned to the various assistant engineers in direct charge of the design work, except for work on lock operation and maintenance, which is in direct charge of the office engineer, who has also prepared requisitions and specifications for the electrical equipment of Gamboa and Darien substations, regulating valves and machines, towing locomotives, track turnouts, and all other equipment which has been required during the fiscal year for the operation and maintenance of the locks.

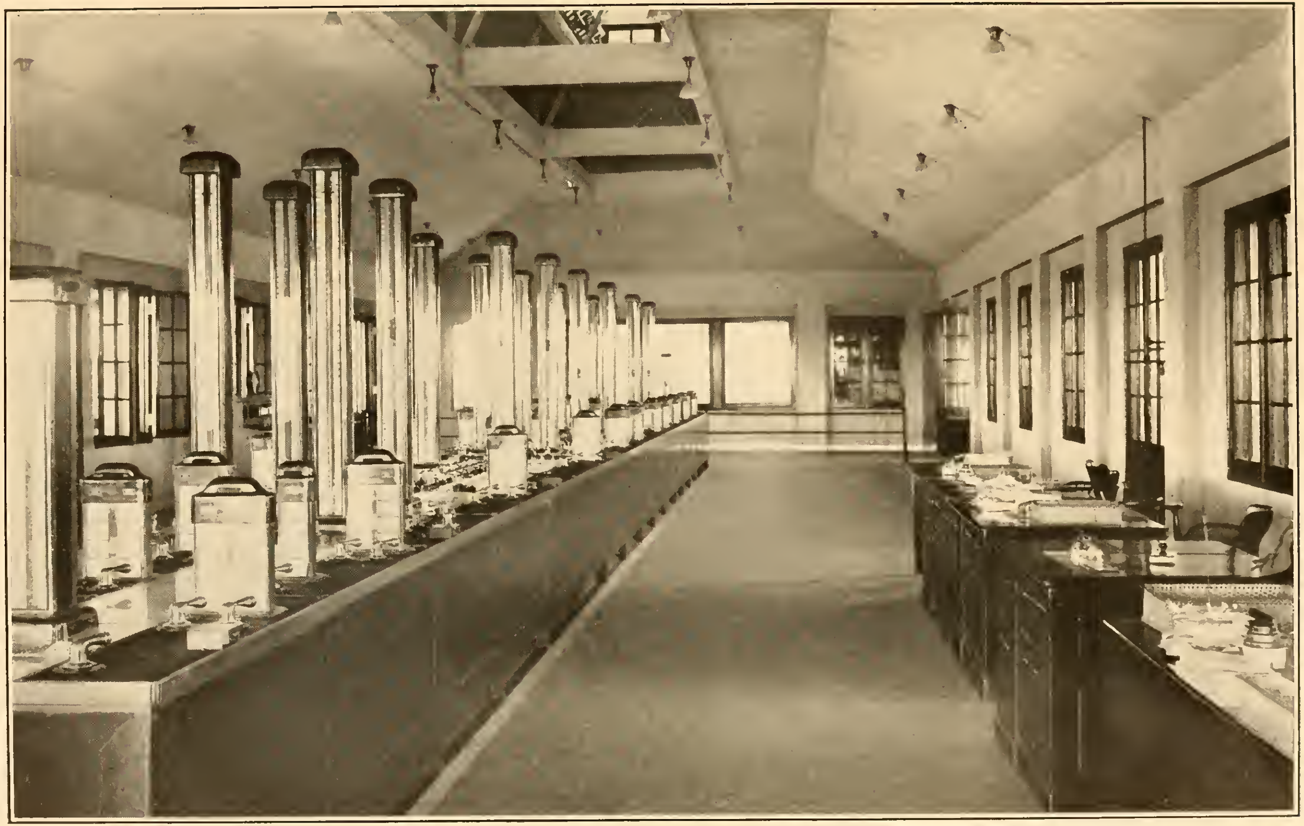
The blue-print room maintained in connection with the drafting room has produced a total of 522,691 square feet of blue, white, brown, and cloth prints.

Respectfully,

Chester Harding,
Engineer of Maintenance.

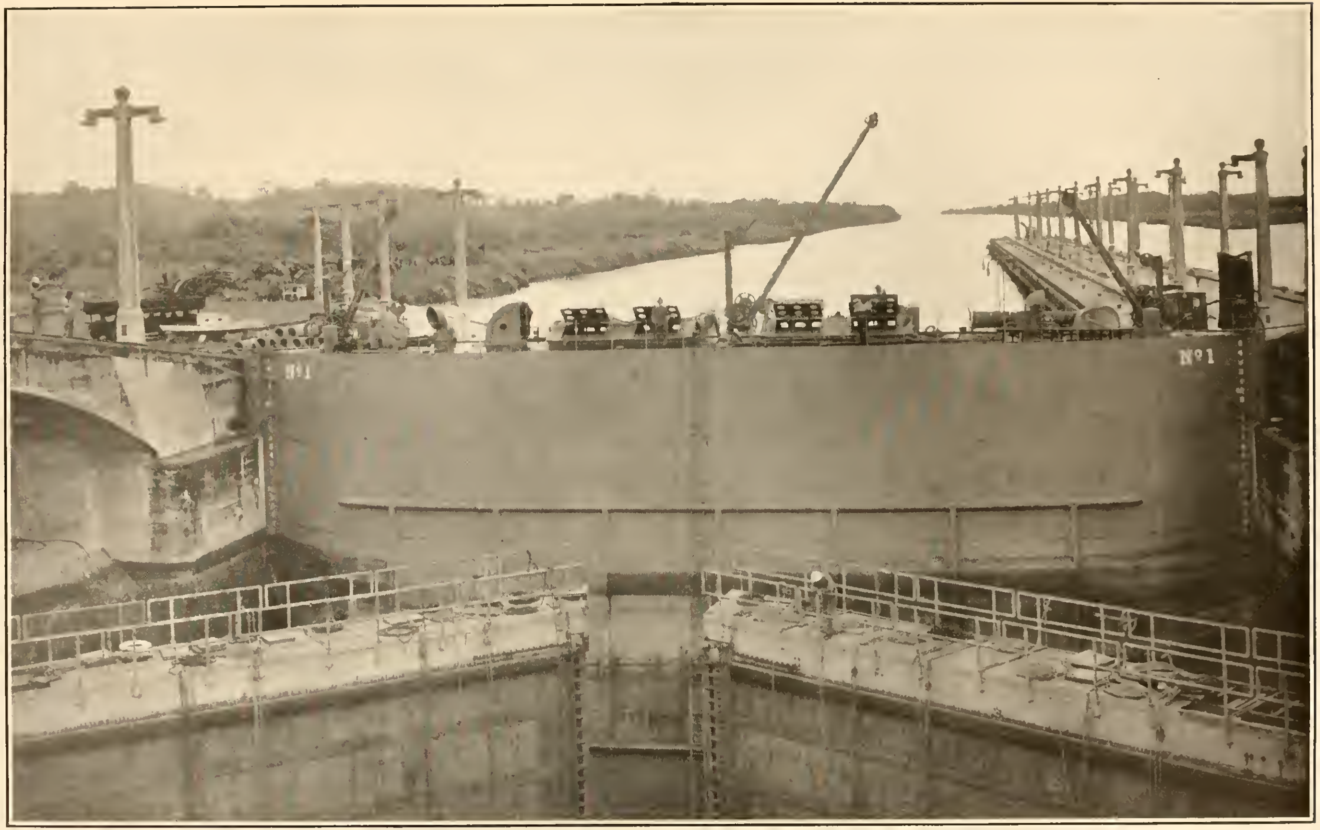
Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

PLATE 1.



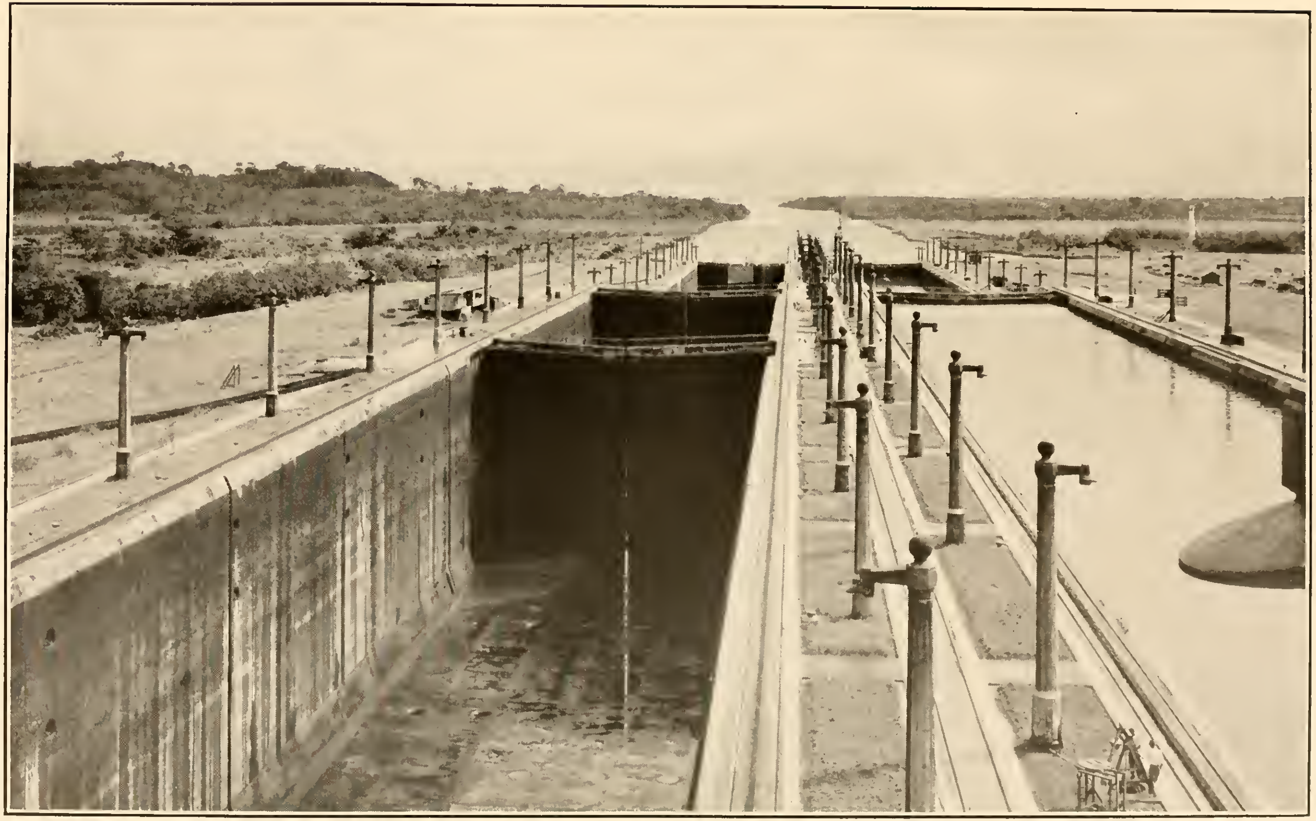
GATUN LOCKS. CONTROL HOUSE, THIRD FLOOR, SHOWING CONTROL BOARD. MARCH 16, 1915.

PLATE 2.



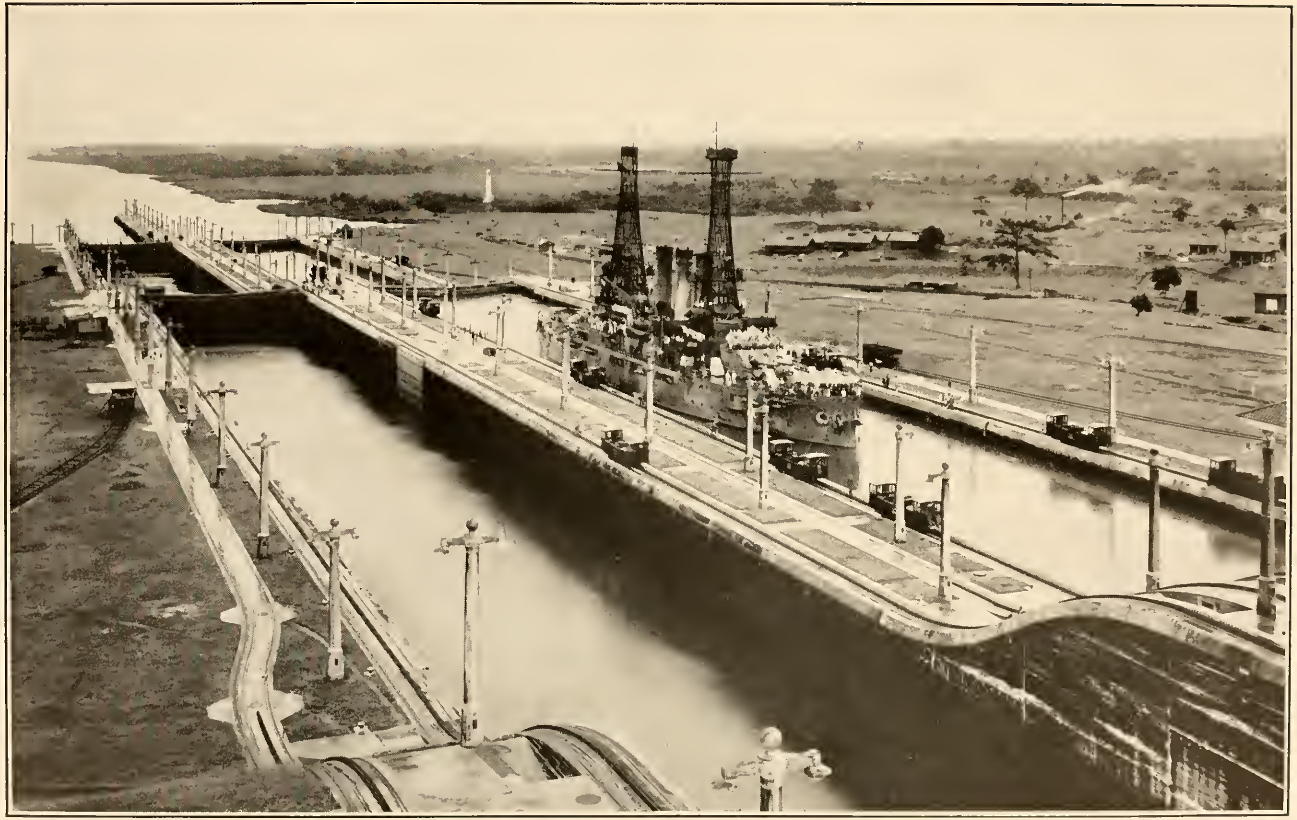
GATUN LOCKS. LOCK ENTRANCE CAISSON AT LOWER WEST CHAMBER.

PLATE 3.



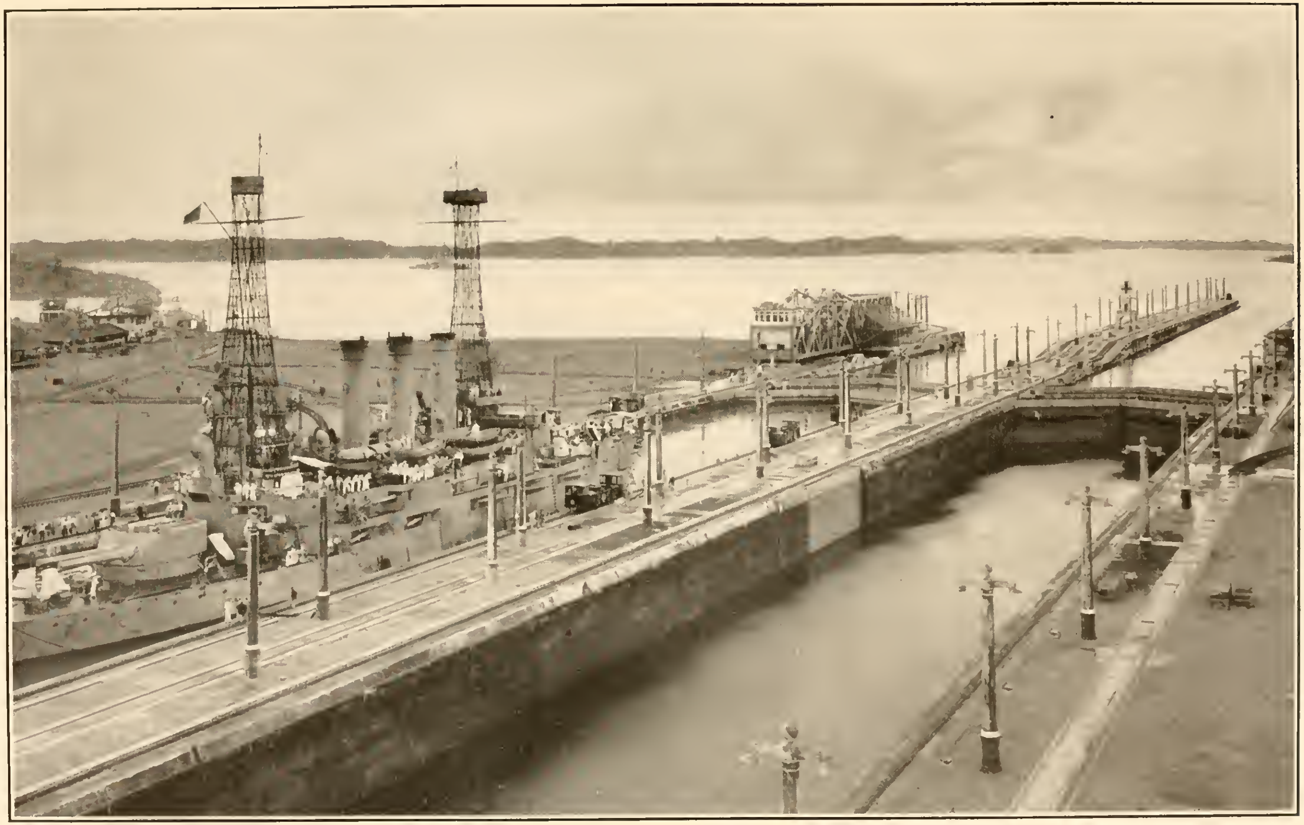
GATUN LOCKS. LOOKING NORTH FROM CONTROL HOUSE, SHOWING WEST CHAMBERS UNWATERED. JULY, 1915.

PLATE 4.



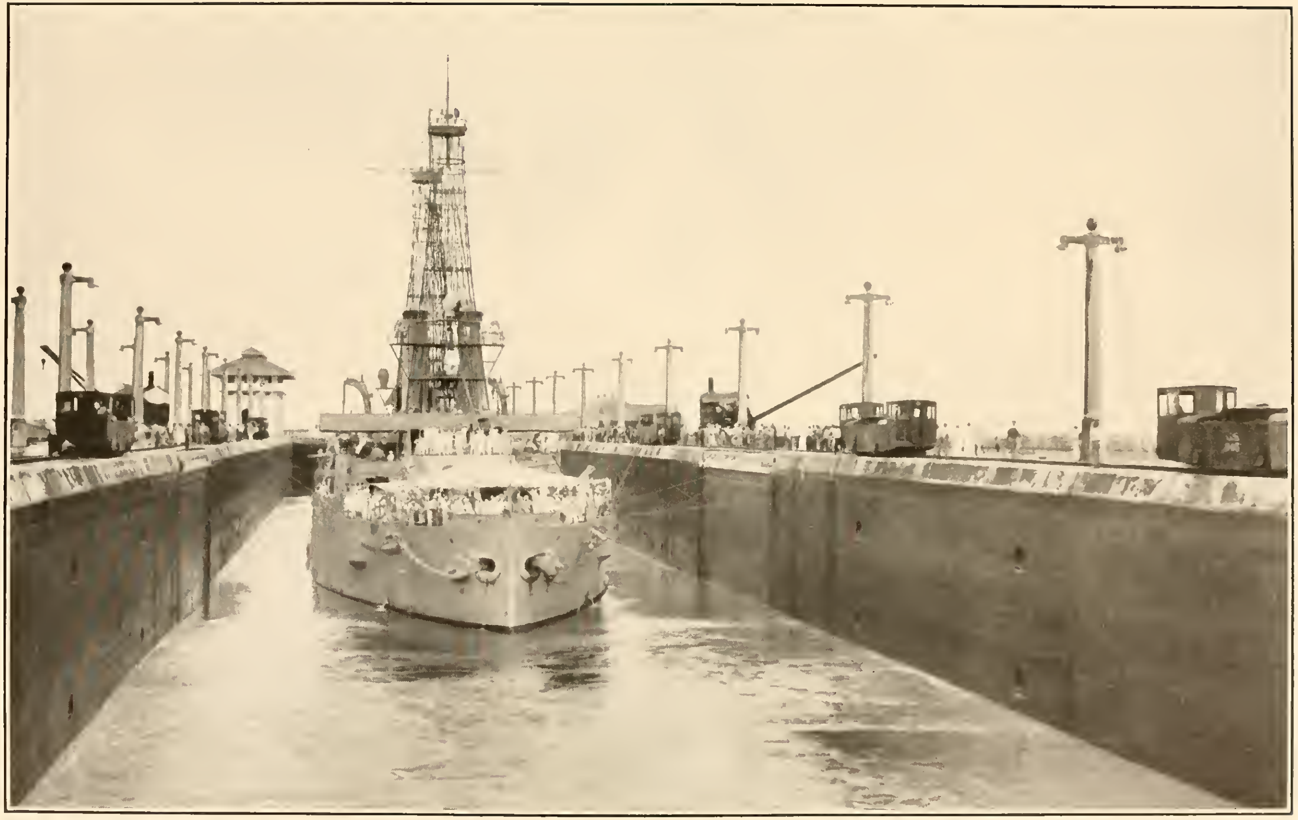
GATUN LOCKS. U. S. S. "OHIO" IN MIDDLE EAST CHAMBER, LOOKING NORTH, SHOWING LOWER LOCKS AND ATLANTIC ENTRANCE. JULY 15, 1915.

PLATE 5.

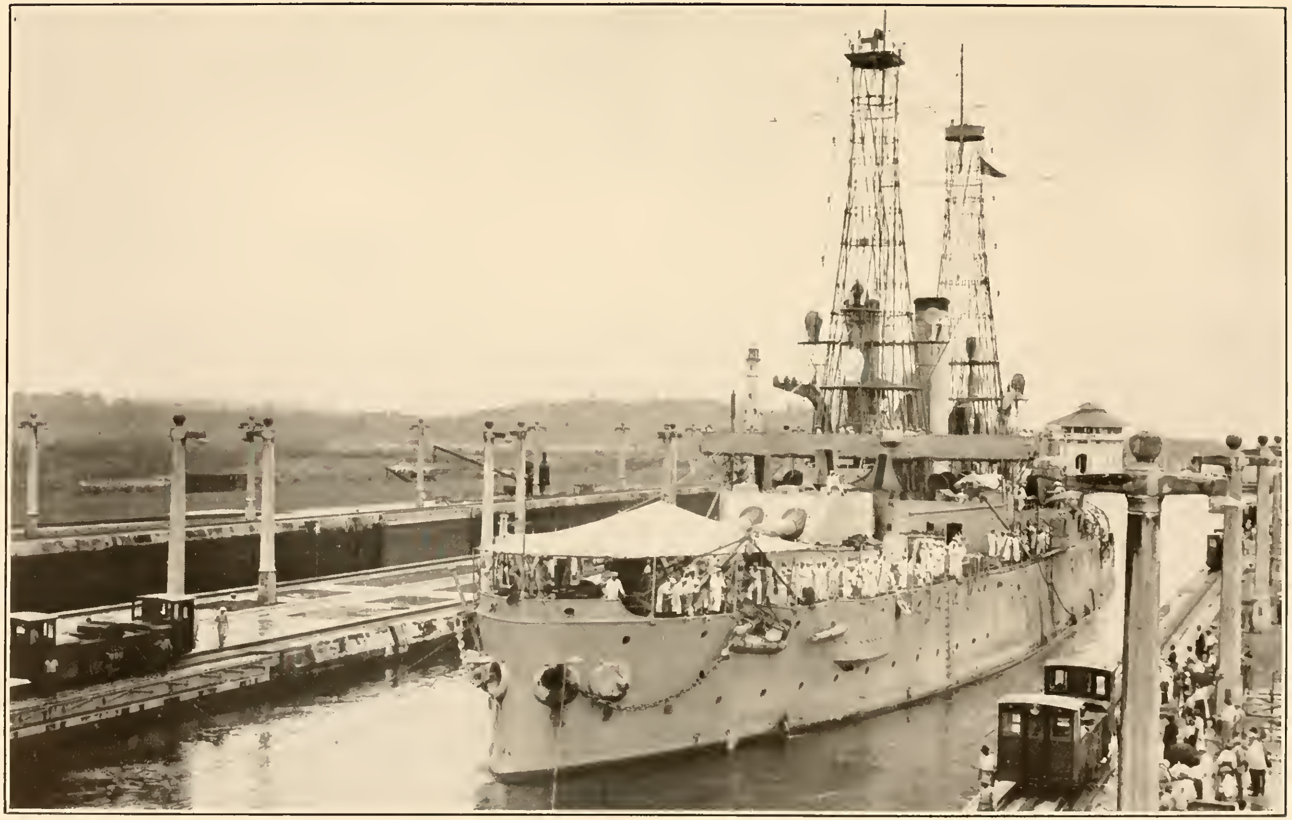


GATUN LOCKS. U. S. S. "OHIO" IN UPPER EAST CHAMBER, LOOKING SOUTH. JULY 15, 1915.

PLATE 6.

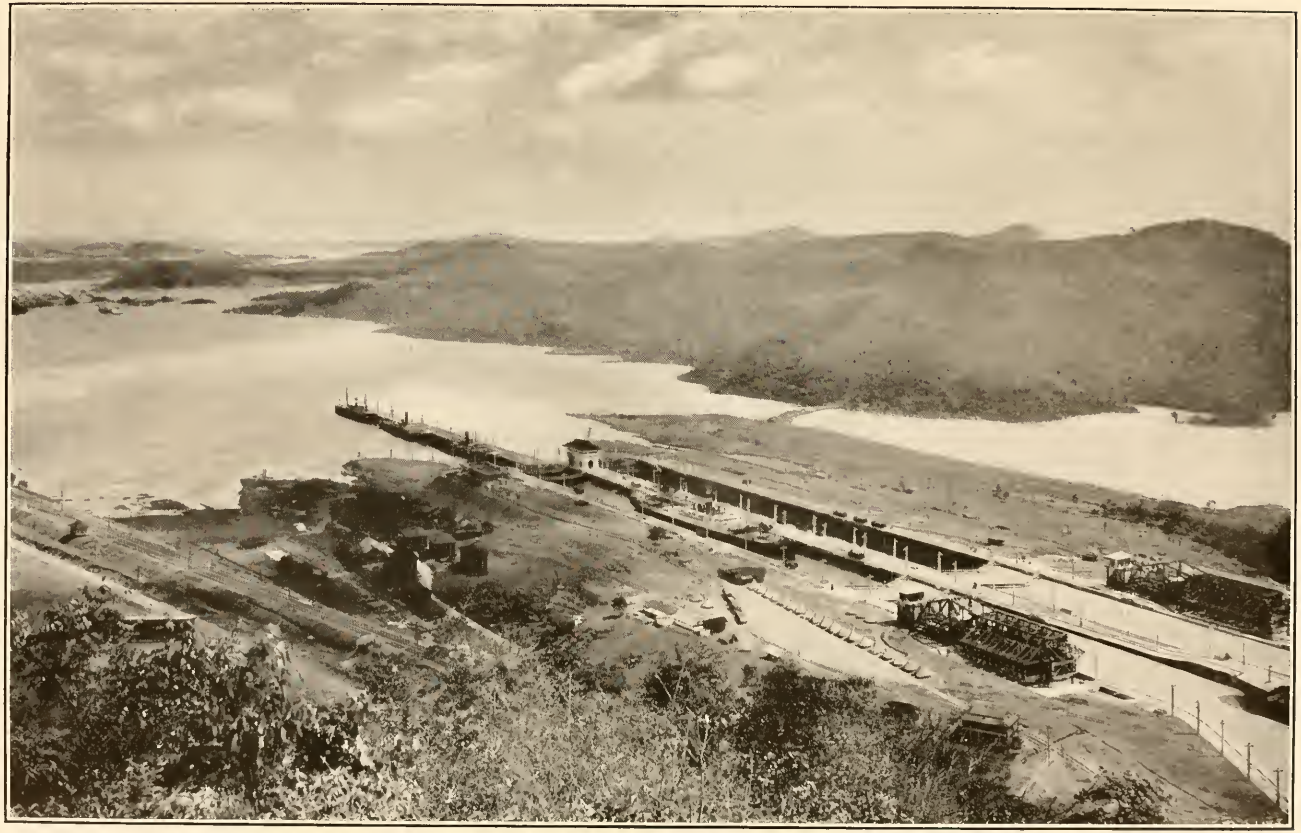


GATUN LOCKS. U. S. S. "WISCONSIN" IN UPPER EAST CHAMBER BEING RAISED TO LAKE LEVEL. JULY 15, 1915.

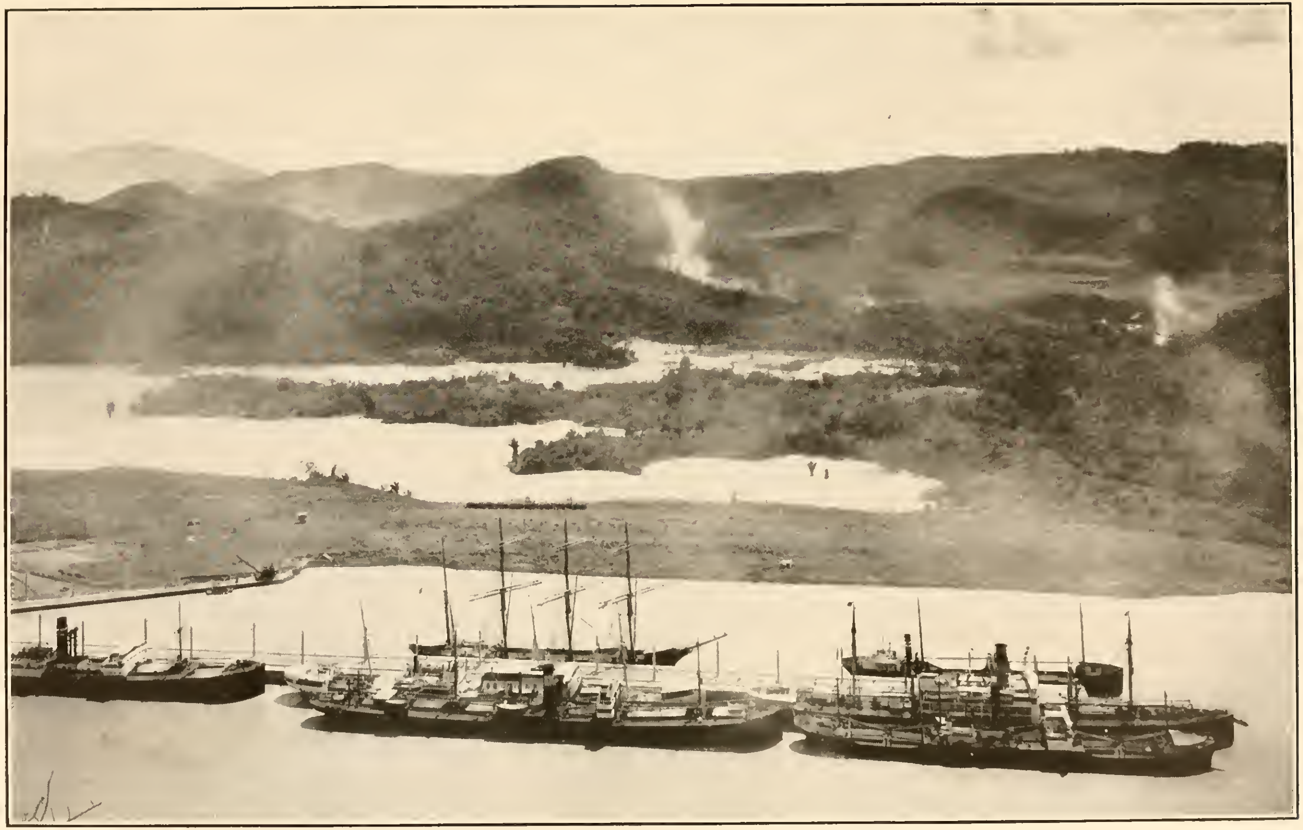


GATUN LOCKS. U. S. S. "WISCONSIN" LEAVING UPPER EAST CHAMBER AND ENTERING GATUN LAKE. JULY 15, 1915.

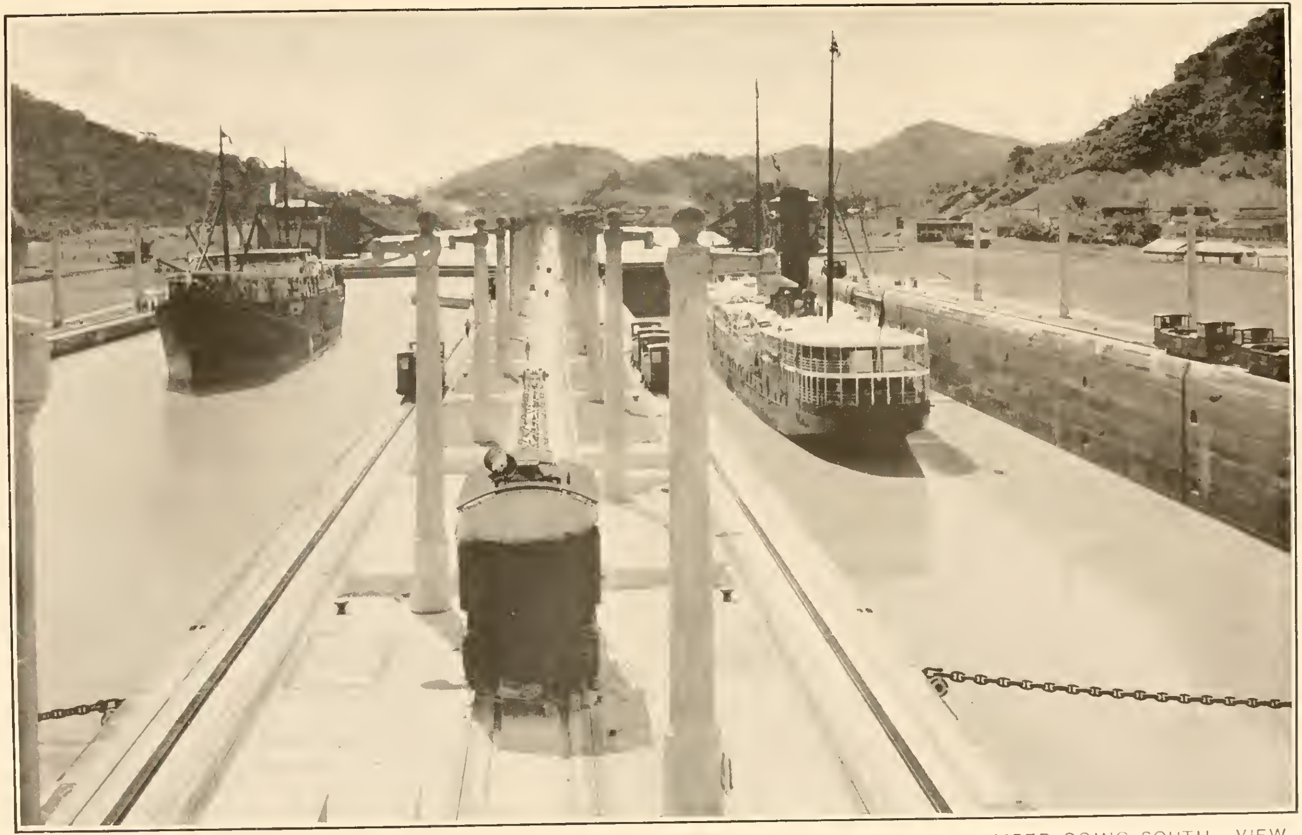
PLATE 8.



PEDRO MIGUEL LOCKS. GENERAL VIEW FROM CERRO LUISA LOOKING SOUTHWEST. MARCH 9, 1915.

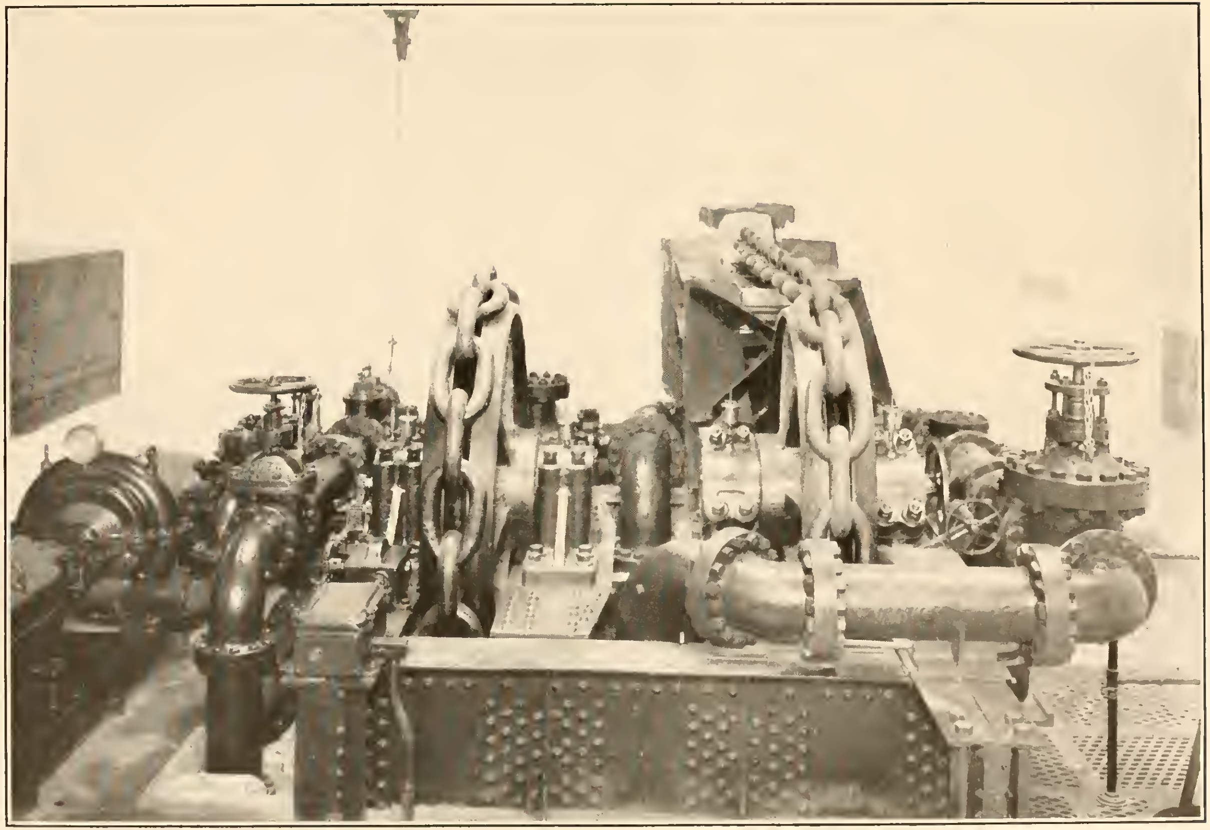


PEDRO MIGUEL LOCKS. BIRD'S-EYE VIEW OF NORTH APPROACH WALL SHOWING VESSELS AWAITING PASSAGE THROUGH THE CUT. MARCH 9, 1915.



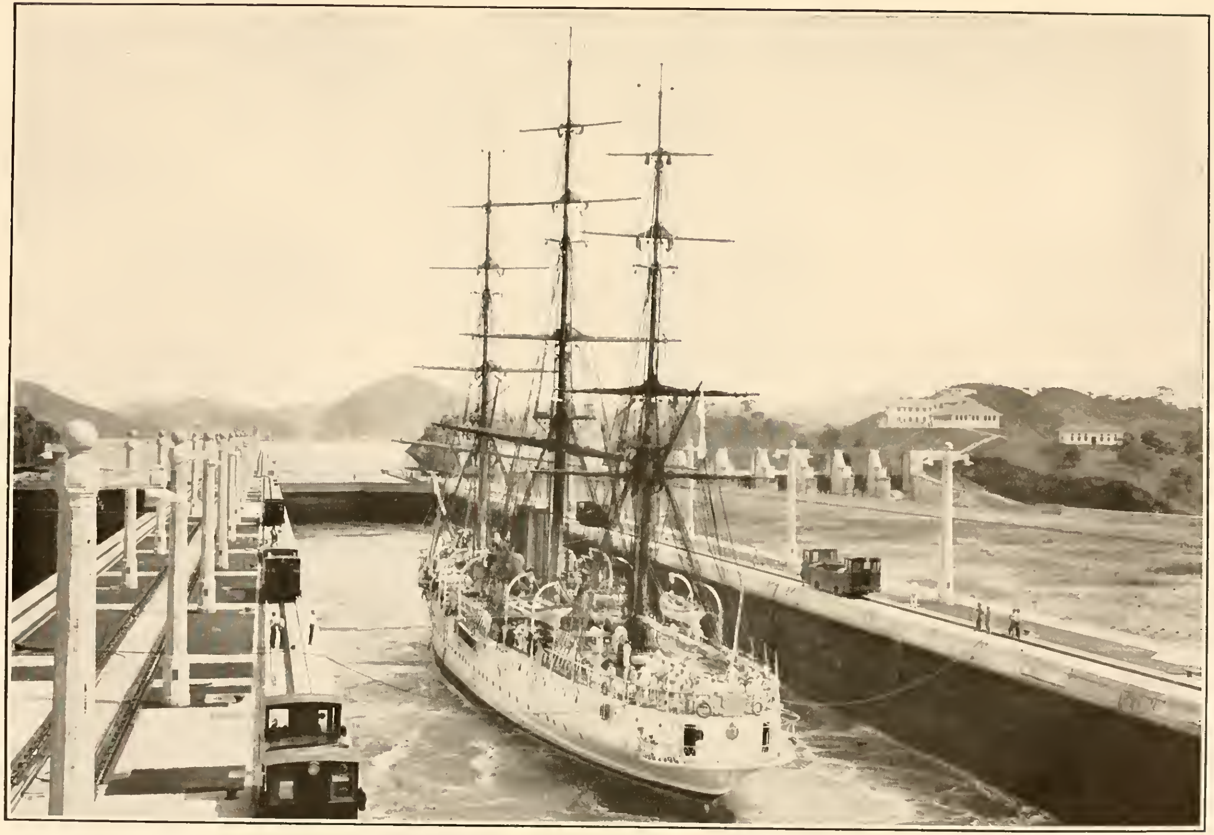
PEDRO MIGUEL LOCKS. VESSEL IN EAST CHAMBER GOING NORTH AND ONE IN WEST CHAMBER GOING SOUTH. VIEW FROM CONTROL HOUSE. JUNE, 1915.

PLATE 11.

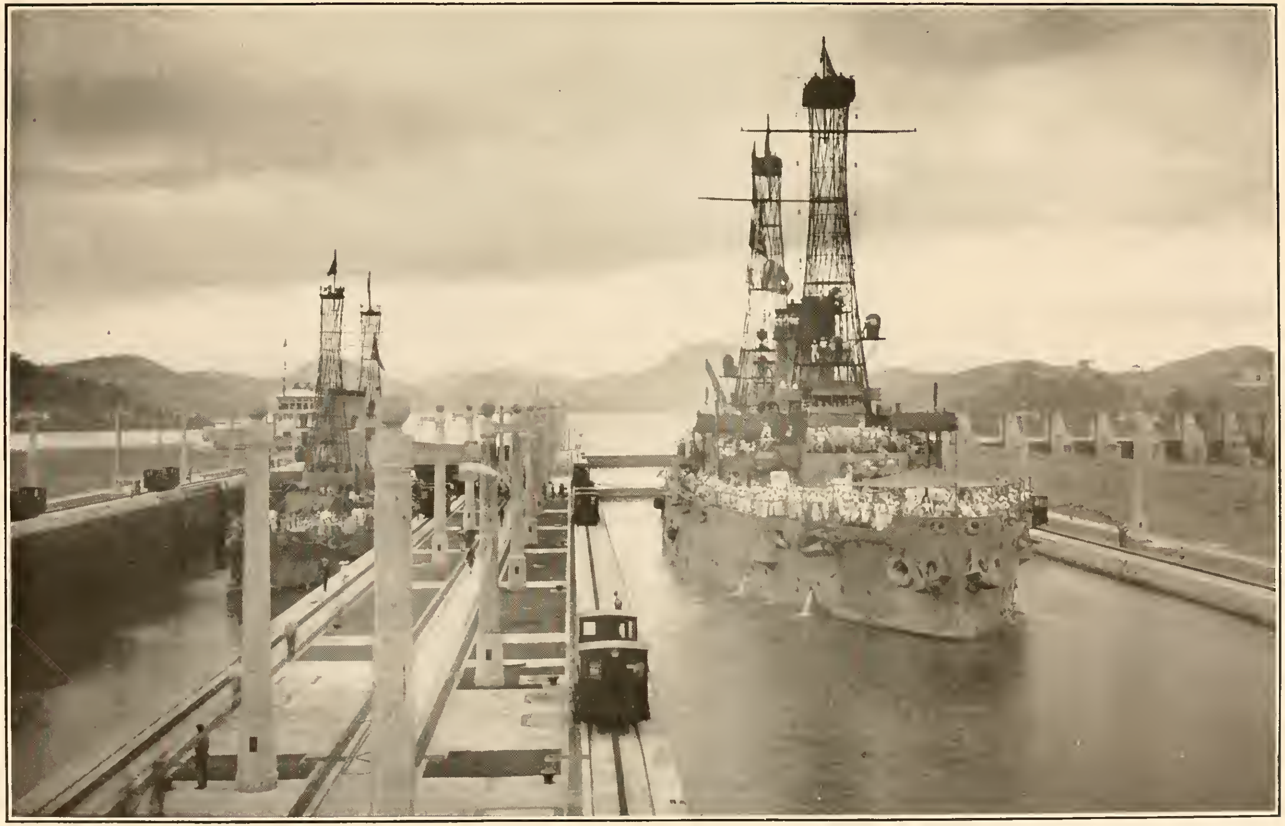


PEDRO MIGUEL LOCKS. CHAIN FENDER MACHINE, UPPER SHEAVES AND CHAINS. NORTH END, EAST SIDE.
MARCH 5, 1915.

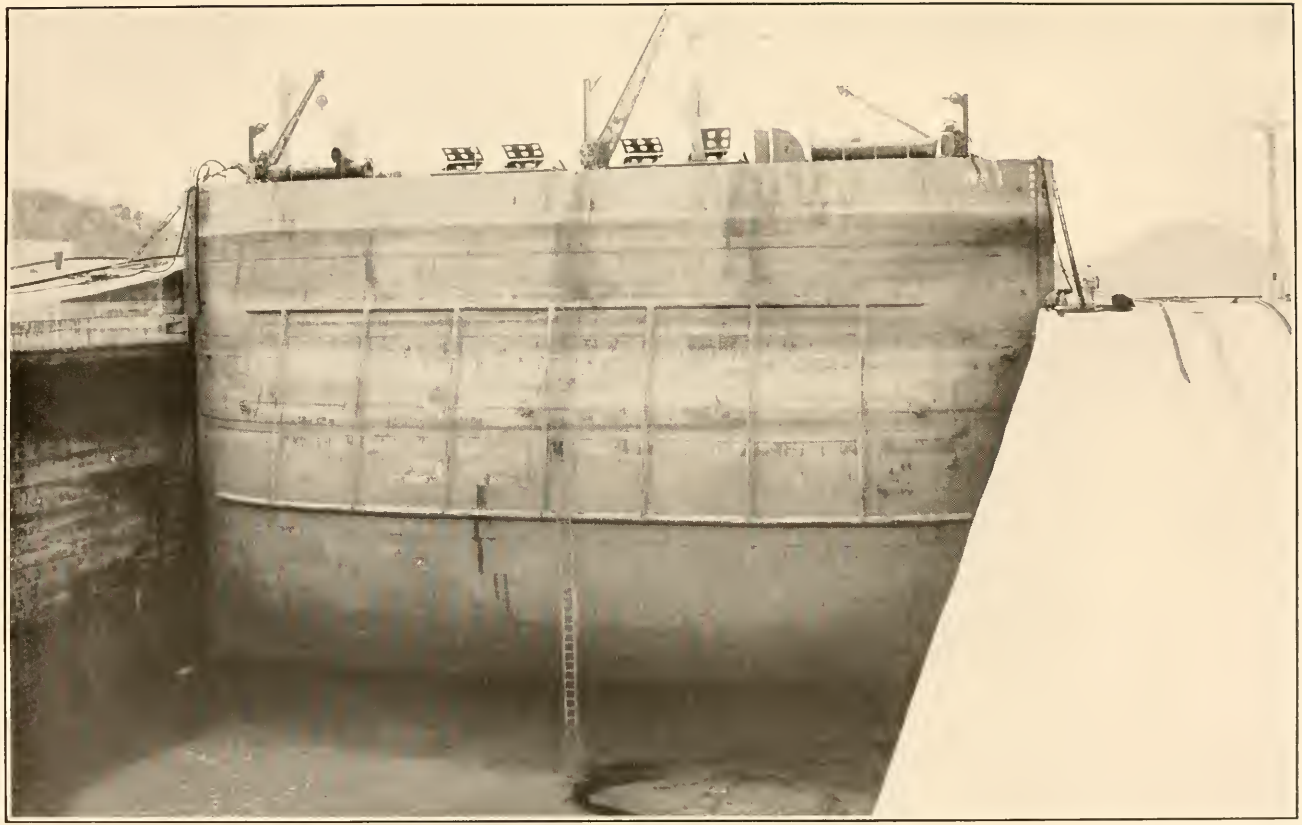
PLATE 12.



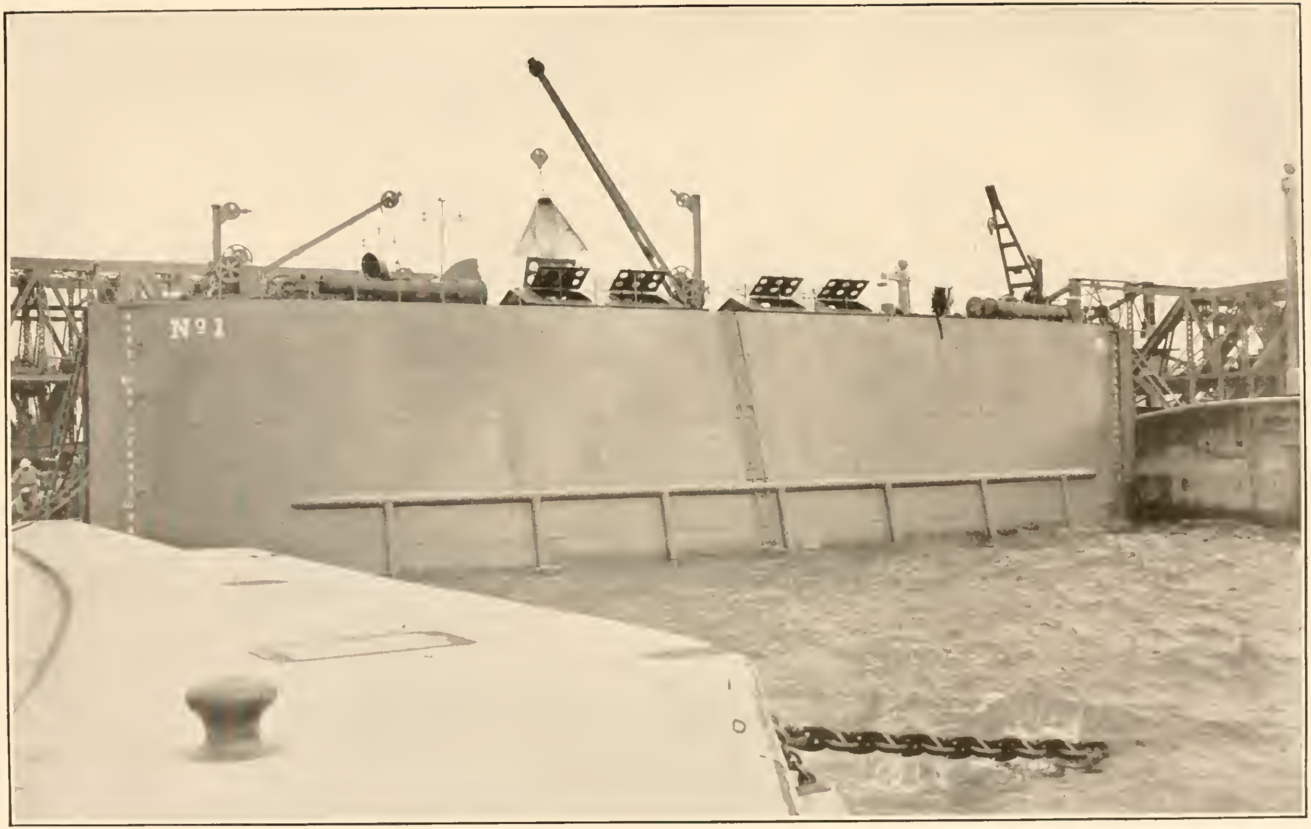
MIRAFLORES LOCKS. ARGENTINE NAVAL TRAINING SHIP "PRESIDENTE SARMIENTO" IN UPPER EAST CHAMBER, LOOKING NORTH FROM CONTROL HOUSE.



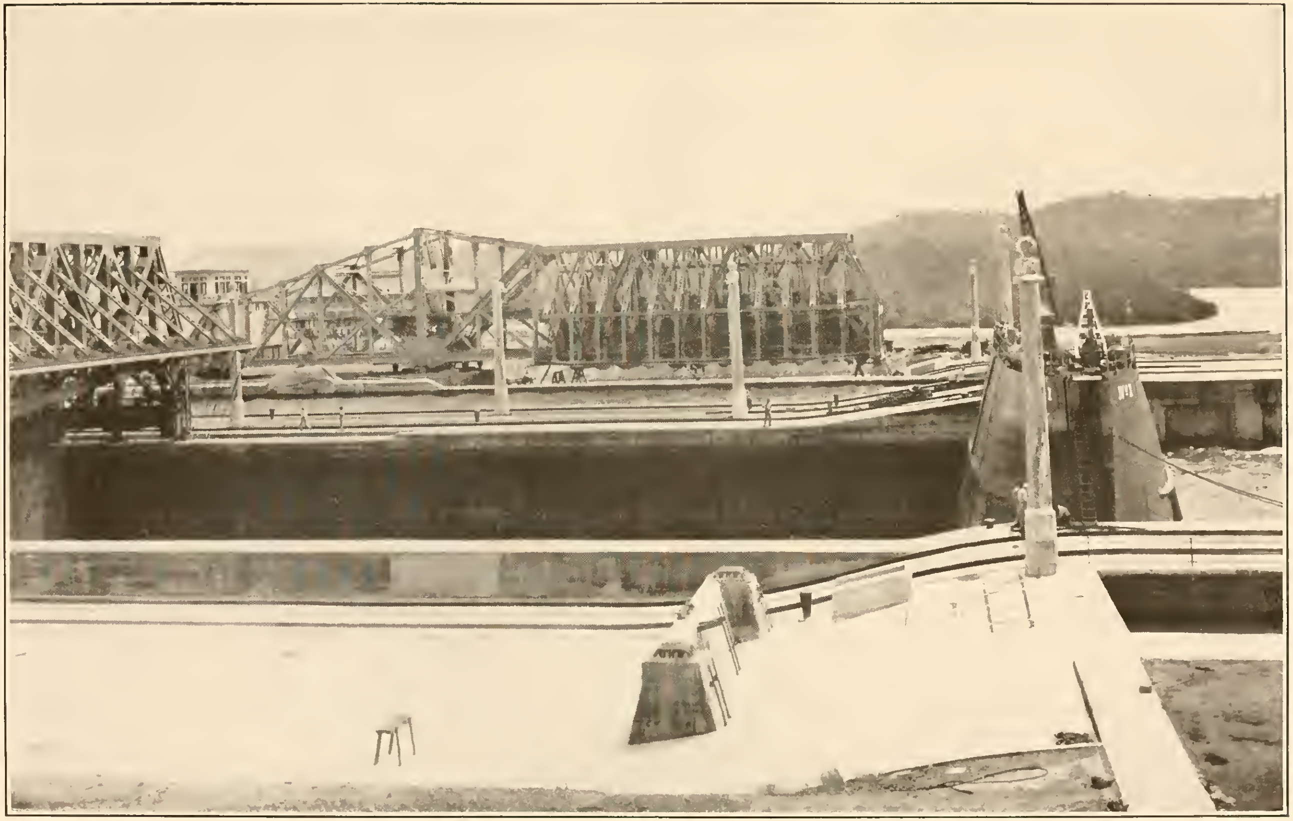
MIRAFLORES LOCKS. U. S. S. "MISSOURI" (LEFT) AND U. S. S. "OHIO" (RIGHT) IN UPPER CHAMBERS. JULY 16, 1915.



MIRAFLORES UPPER LOCKS. LOCK ENTRANCE CAISSON IN PLACE AT NORTH END OF EAST CHAMBER. DOWNSTREAM OR LOW-WATER SIDE. APRIL 12, 1915.

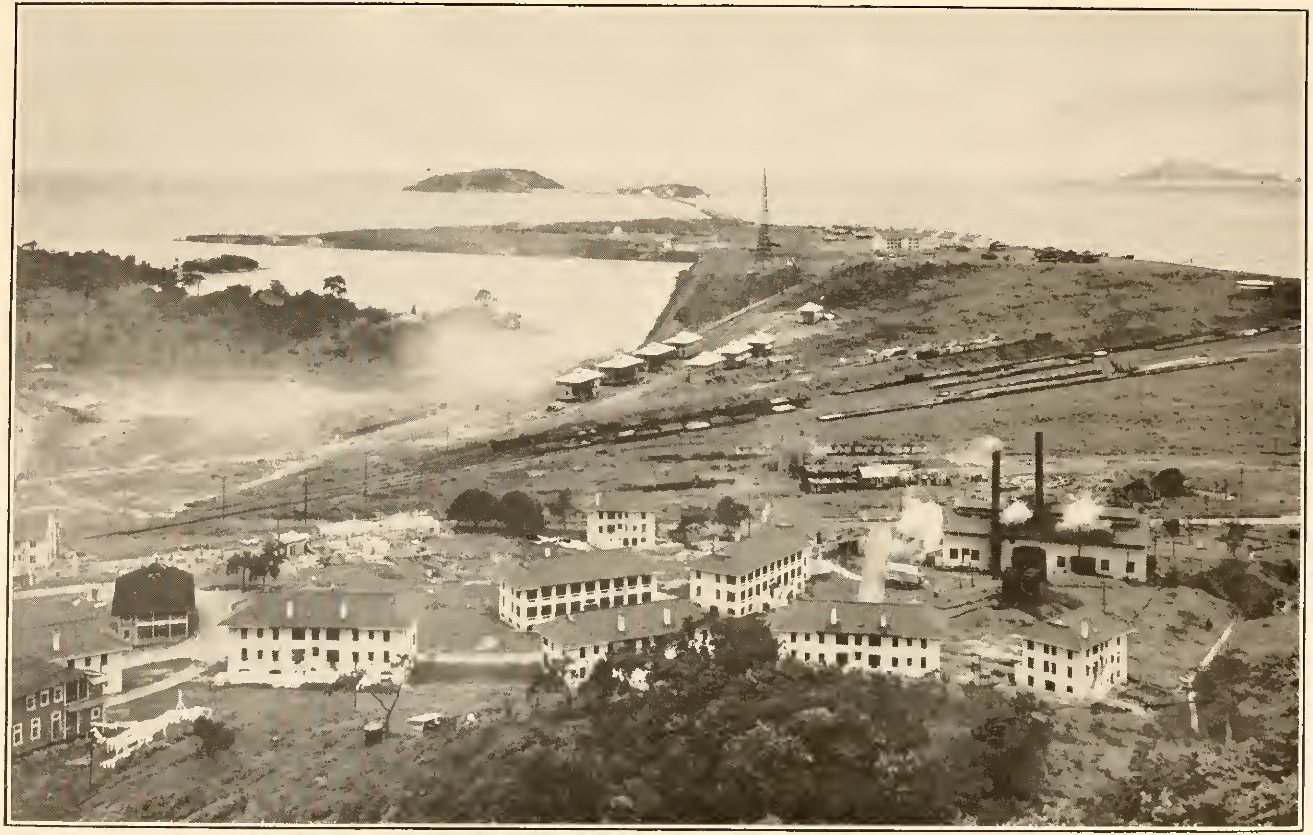


MIRAFLORES UPPER LOCKS. LOCK ENTRANCE CAISSON IN PLACE AT NORTH END OF EAST CHAMBER. UPSTREAM OR HIGH-WATER SIDE; ALSO SHOWING CHAIN FENDER IN PLACE. APRIL 12, 1915.

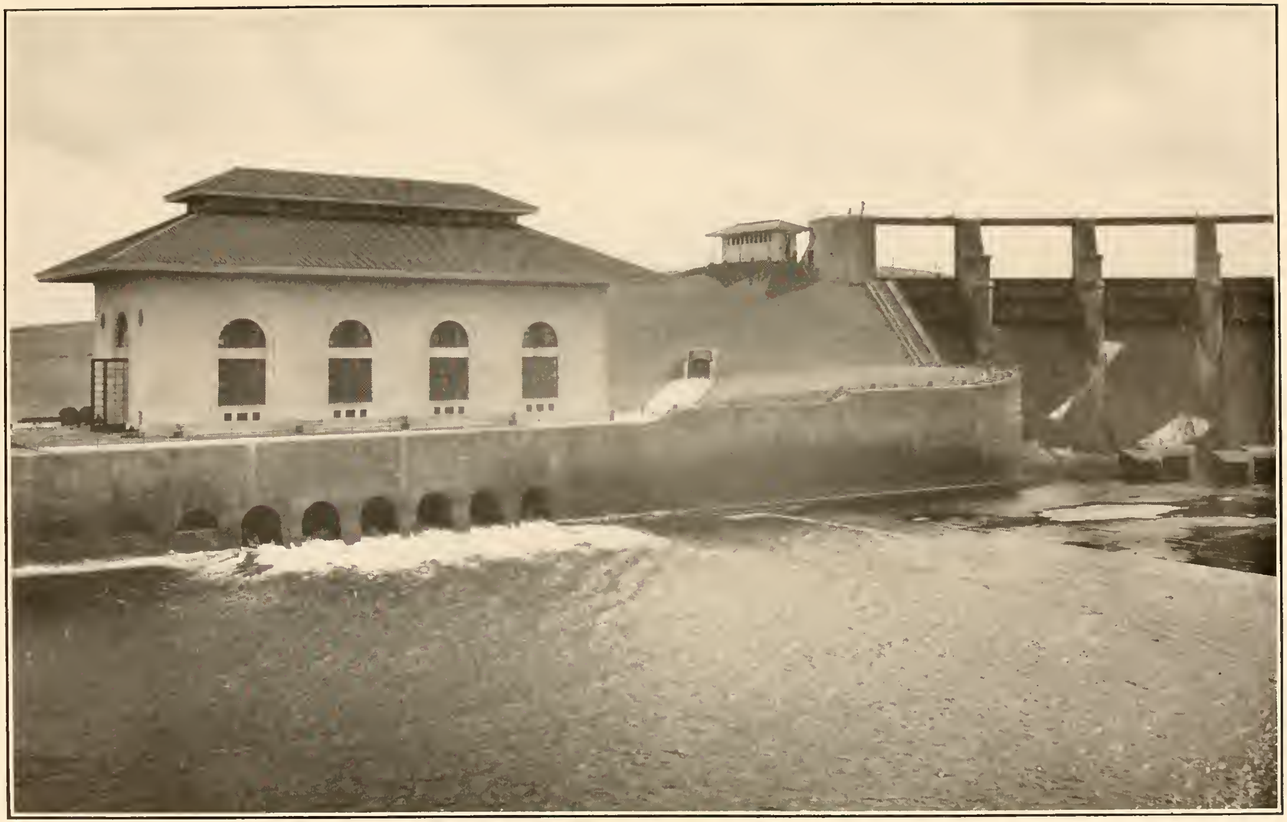


MIRAFLORES UPPER LOCKS. LOCK ENTRANCE CAISSON IN PLACE AT NORTH END OF EAST CHAMBER. END VIEW SHOWING WATER OF MIRAFLORES LAKE HELD IN CHECK. APRIL 12, 1915.

PLATE 17.

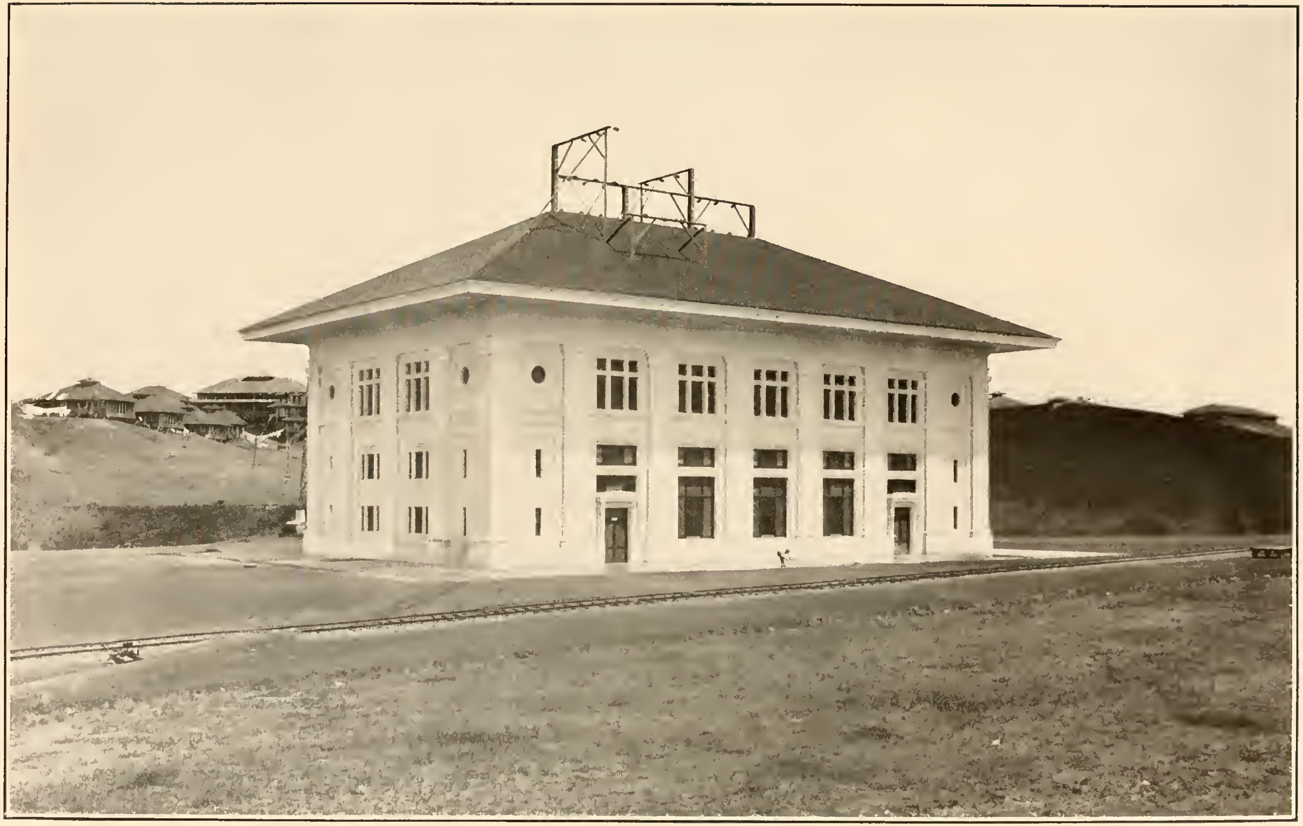


NAOS ISLAND BREAKWATER. LOOKING SOUTH FROM SOSA HILL. JUNE 7, 1915.



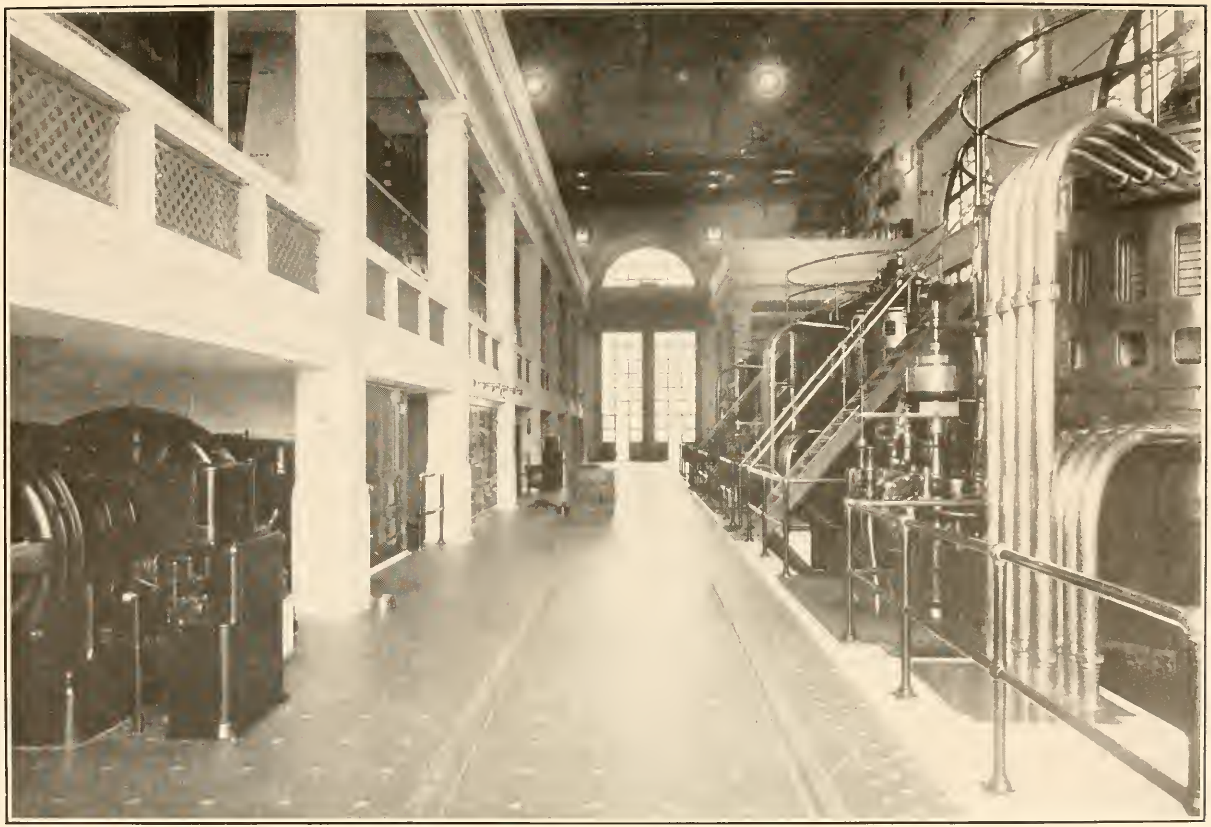
HYDROELECTRIC STATION, GATUN. VIEW FROM WEST SIDE SHOWING GATE HOUSE AND EAST END OF SPILLWAY DAM. JANUARY 29, 1915.

PLATE 19.



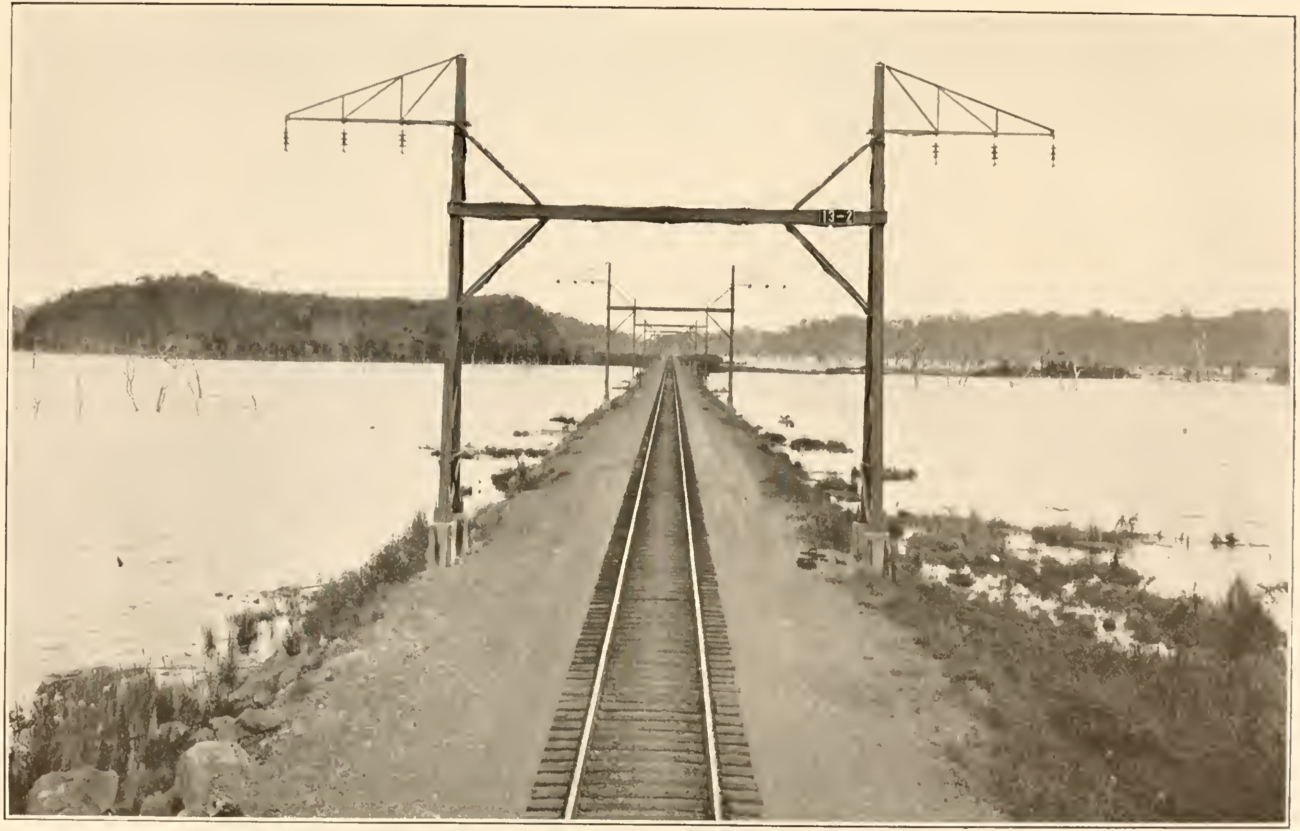
TRANSMISSION SYSTEM. GATUN SUBSTATION, LOOKING WEST. MARCH 16, 1915.

PLATE 20.

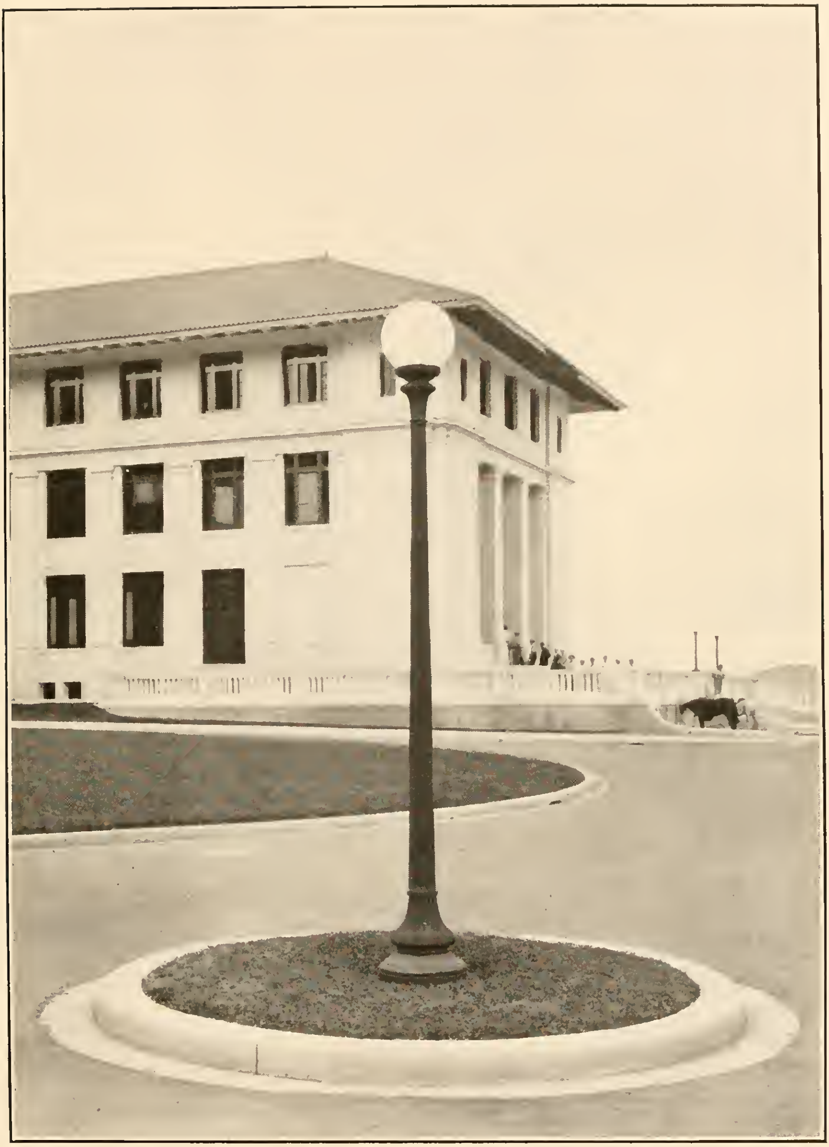


HYDROELECTRIC STATION, GATUN. INTERIOR VIEW. JUNE, 1915.

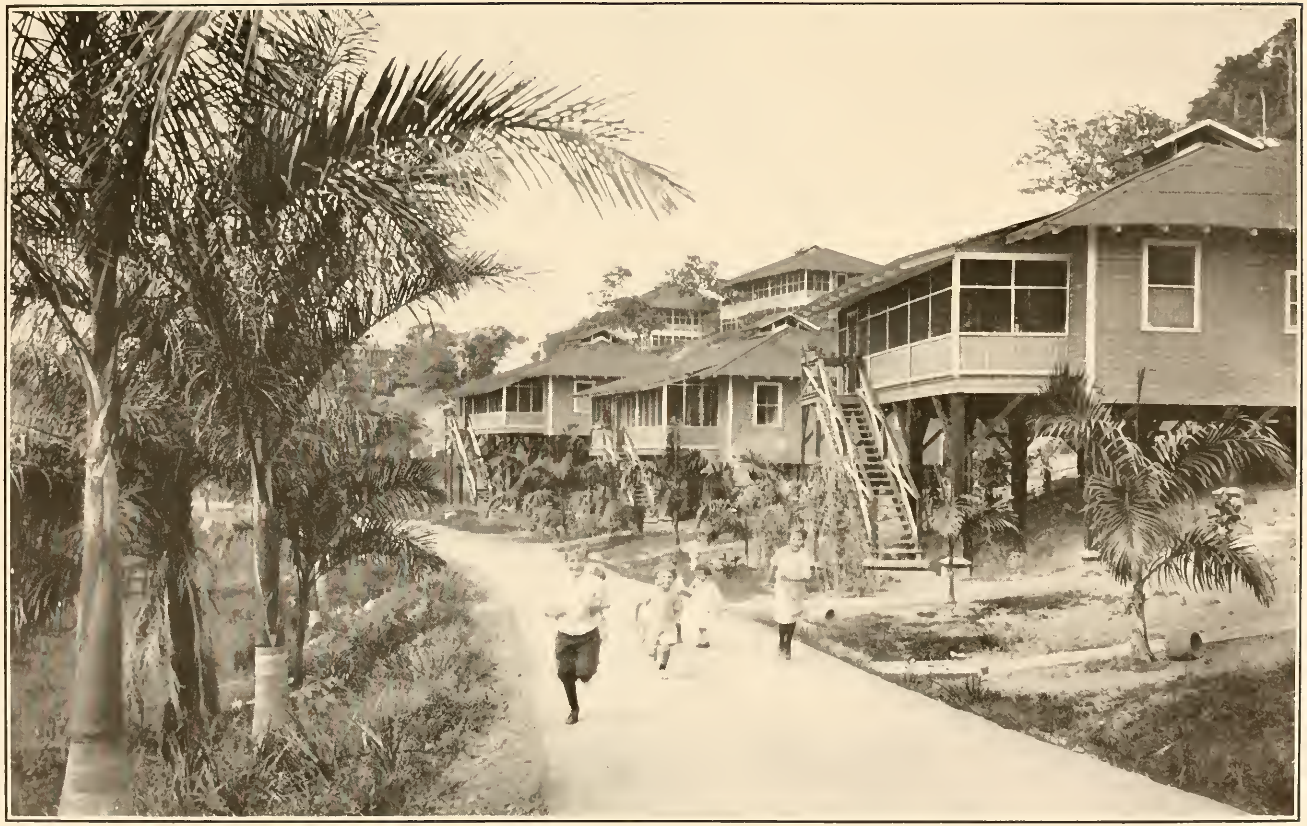
PLATE 21.



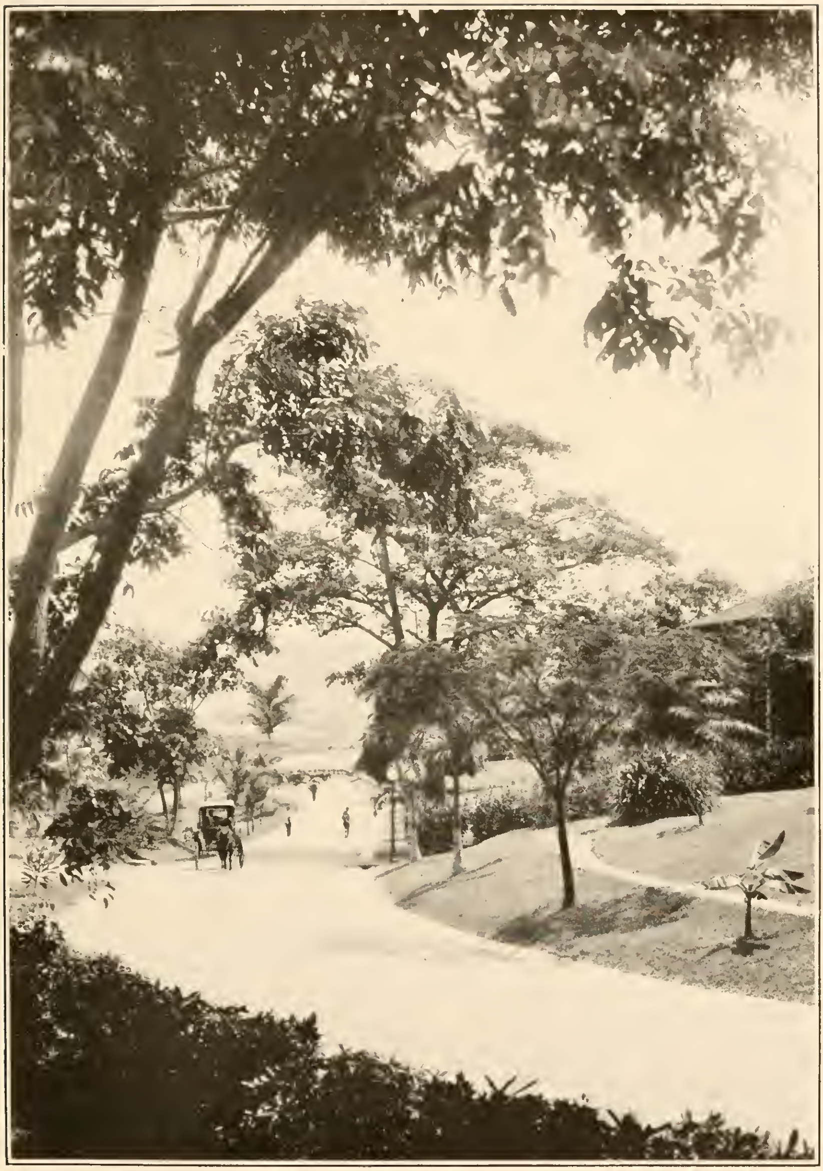
TRANSMISSION LINE. TOWERS ALONG PANAMA RAILROAD, AT QUEBRADA BAJA BOTTOM, CARRYING 44,000-VOLT TRANSMISSION LINE, LOOKING NORTH. FEBRUARY 25, 1915.



PART OF NORTH WING OF ADMINISTRATION BUILDING, BALBOA HEIGHTS, AND CAST-IRON LAMP-POST USED IN NEW STREET-LIGHTING SYSTEM.

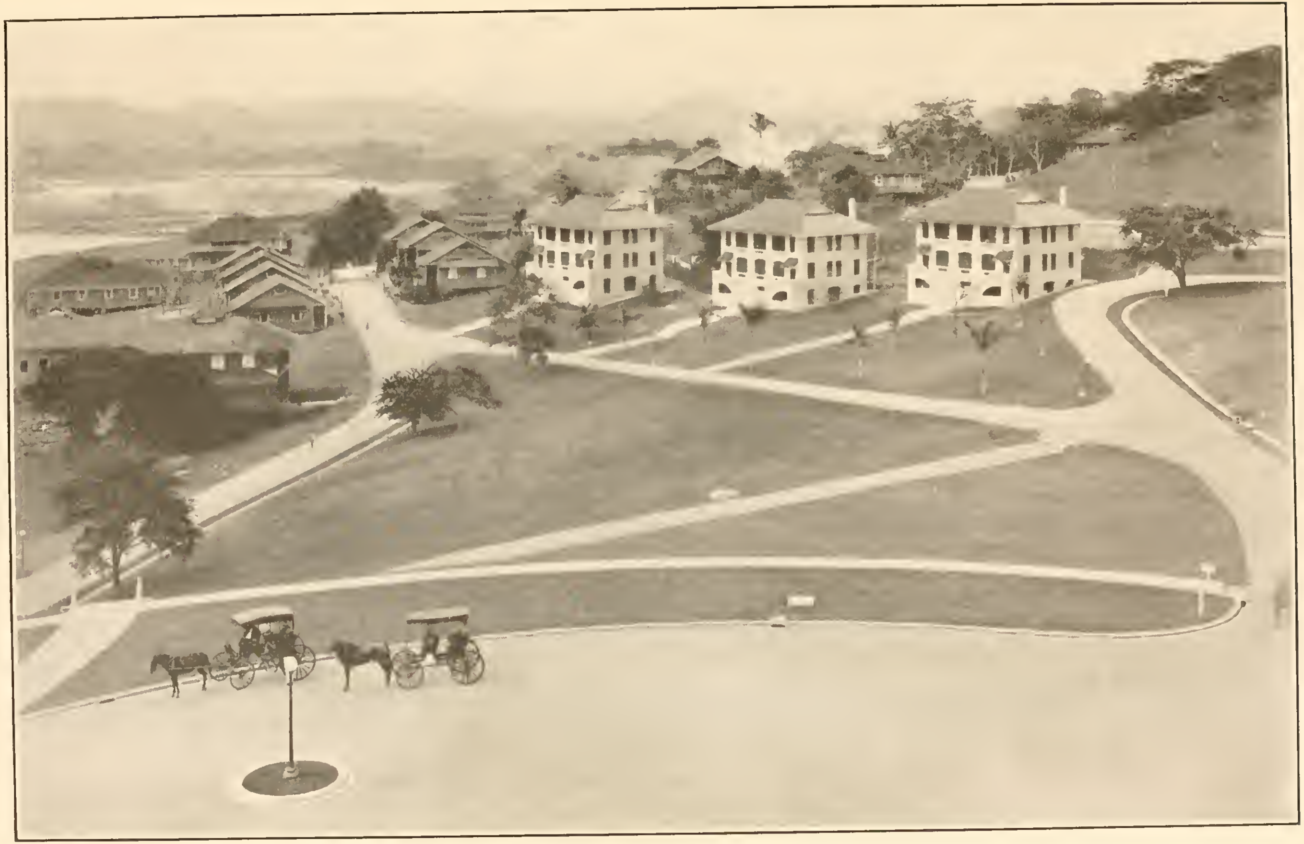


BALBOA HEIGHTS. STREET SCENE SHOWING ASPHALTIC CONCRETE ROAD. JUNE, 1915.



BALBOA HEIGHTS. VIEW ALONG ASPHALTIC CONCRETE UPPER HIGHWAY.
JUNE, 1915.

PLATE 25.

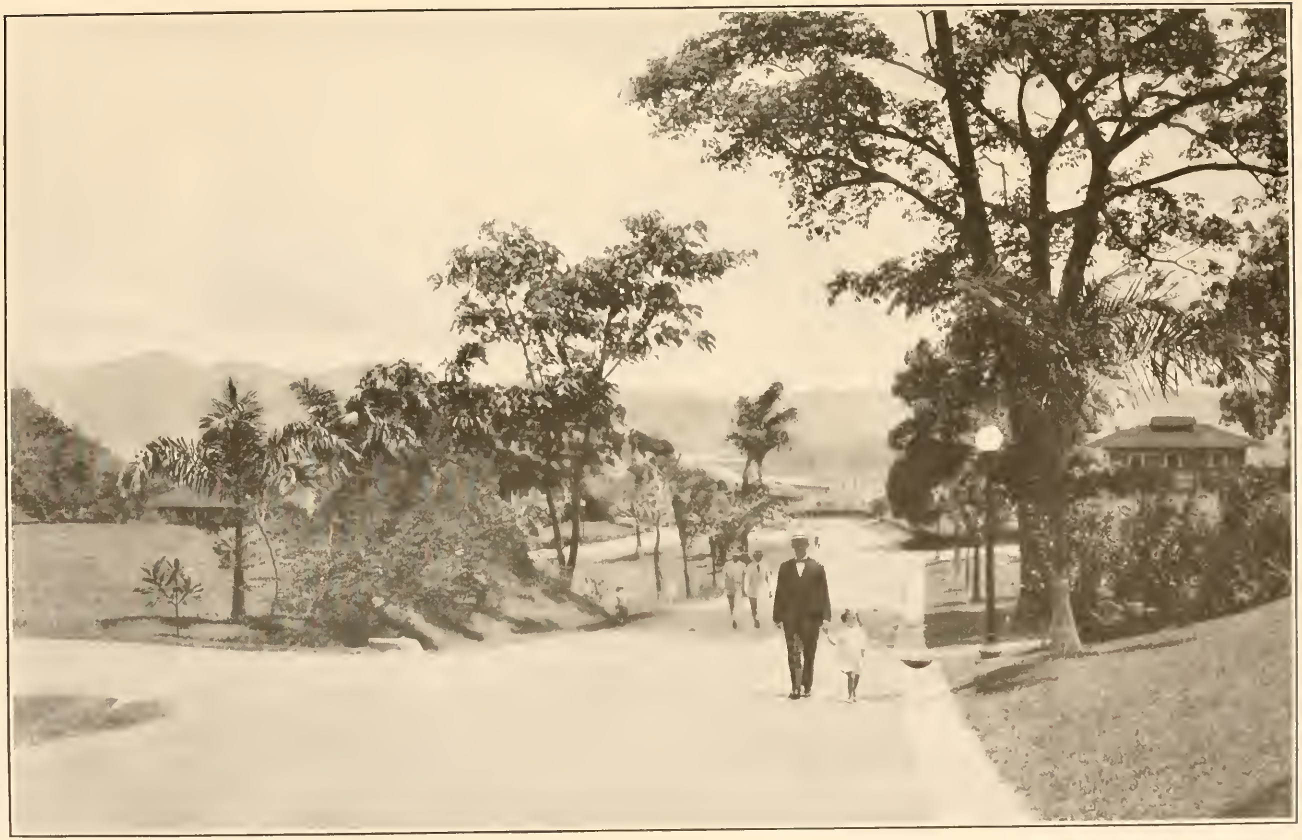


BALBOA HEIGHTS. VIEW FROM TOP OF ADMINISTRATION BUILDING SHOWING ASPHALTIC CONCRETE ROADS AND PARKING. JUNE, 1915.

PLATE 26.

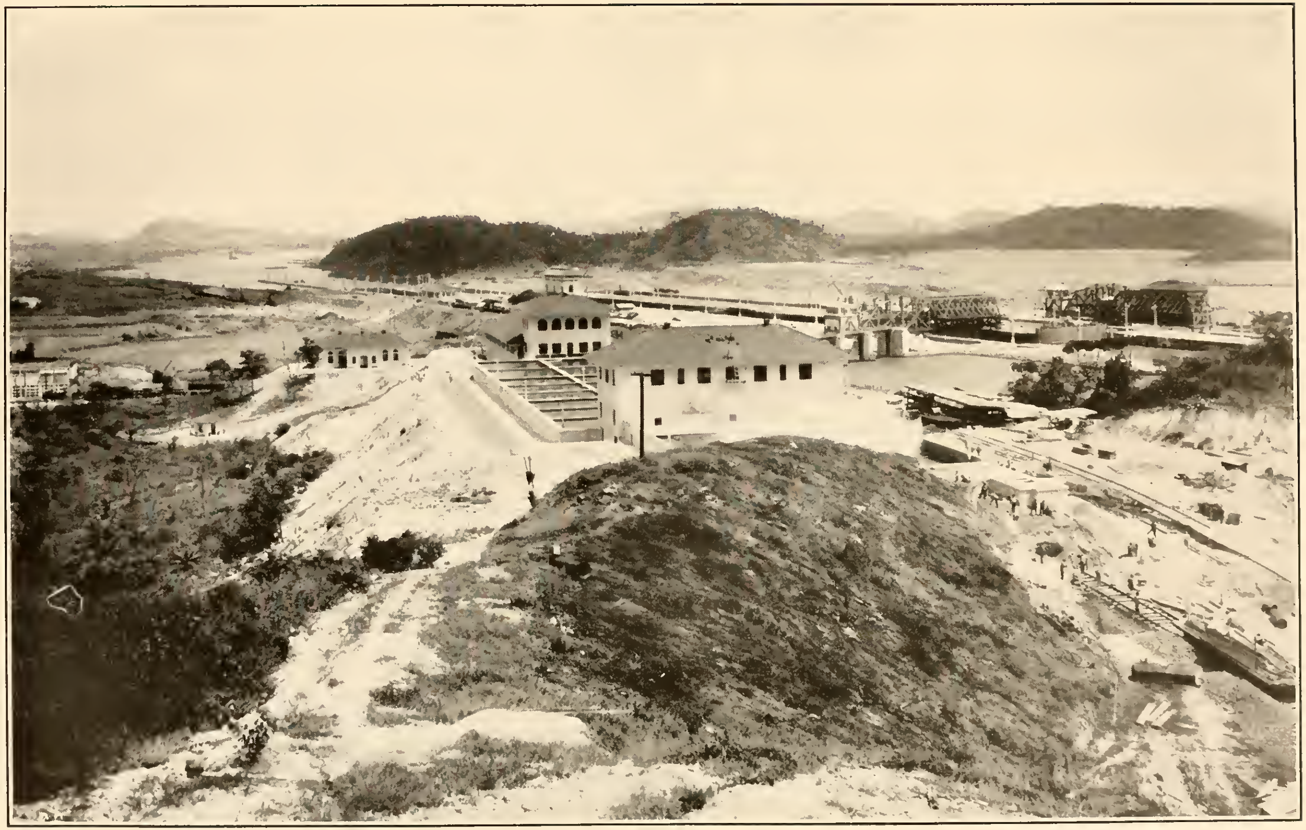
NIGHT VIEW OF BALBOA PRADO AND ADMINISTRATION BUILDING, BALBOA HEIGHTS. JUNE, 1915.

PLATE 27.

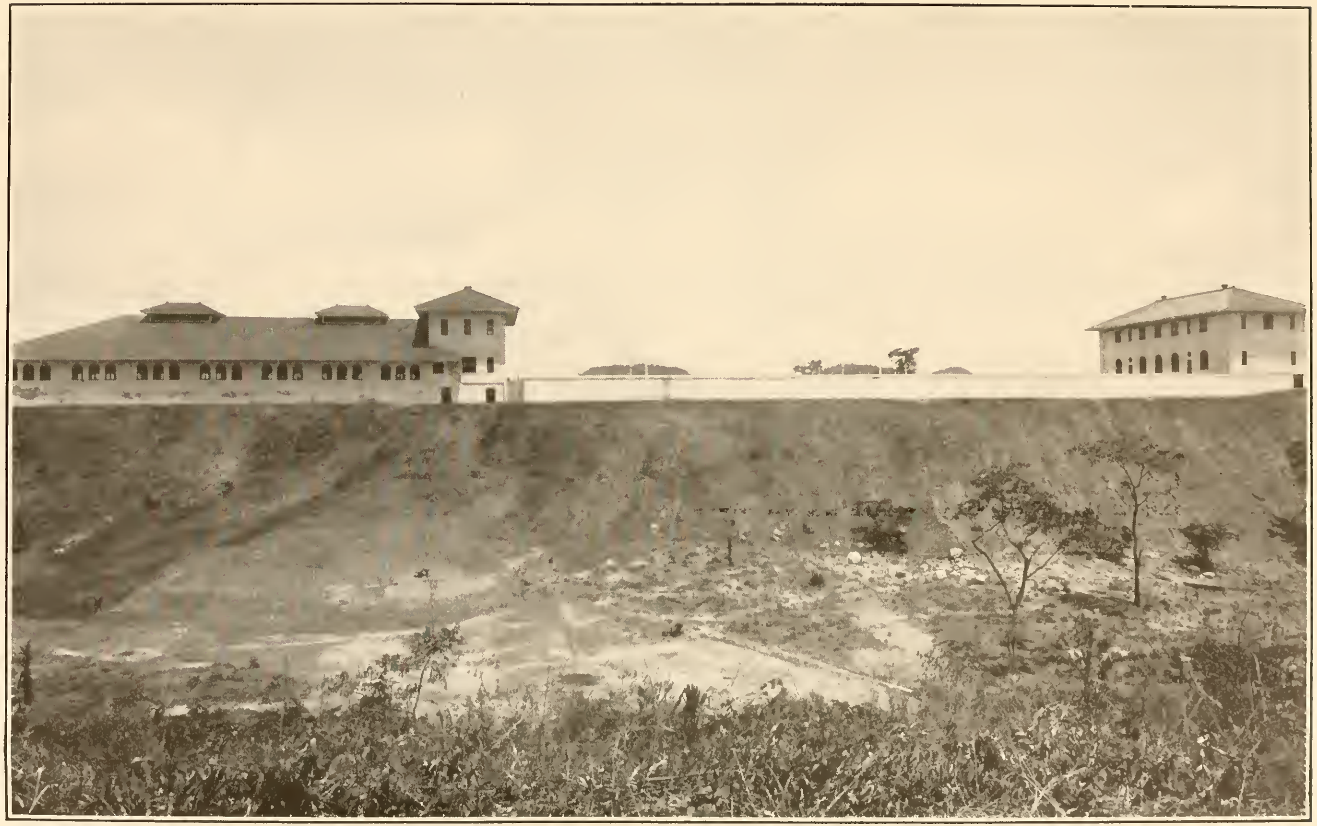


BALBOA HEIGHTS. ASPHALTIC CONCRETE UPPER HIGHWAY, LOOKING NORTH. JUNE, 1915.

PLATE 28.

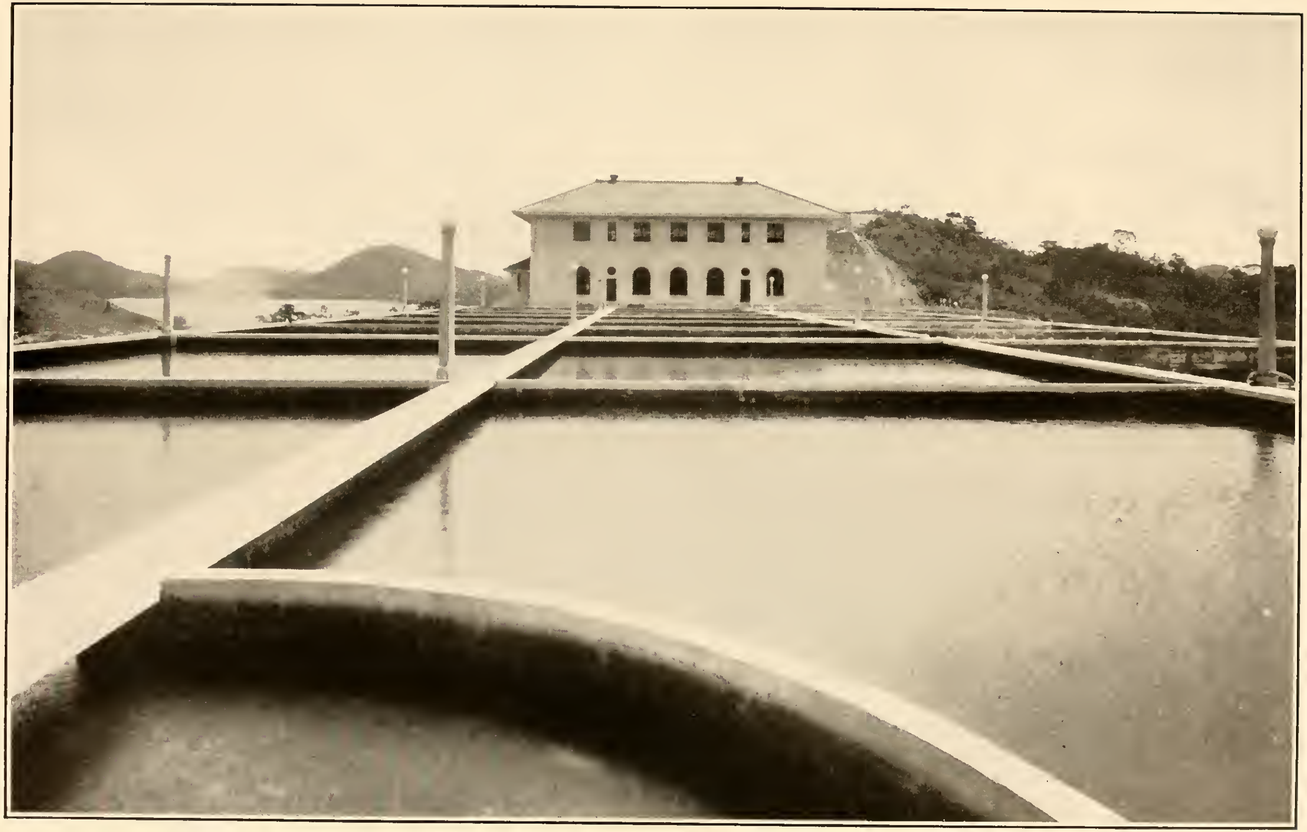


MIRAFLORES WATER-PURIFICATION PLANT. GENERAL VIEW LOOKING SOUTH TOWARD FILTER BUILDING AND PUMP STATION. APRIL 12, 1915.

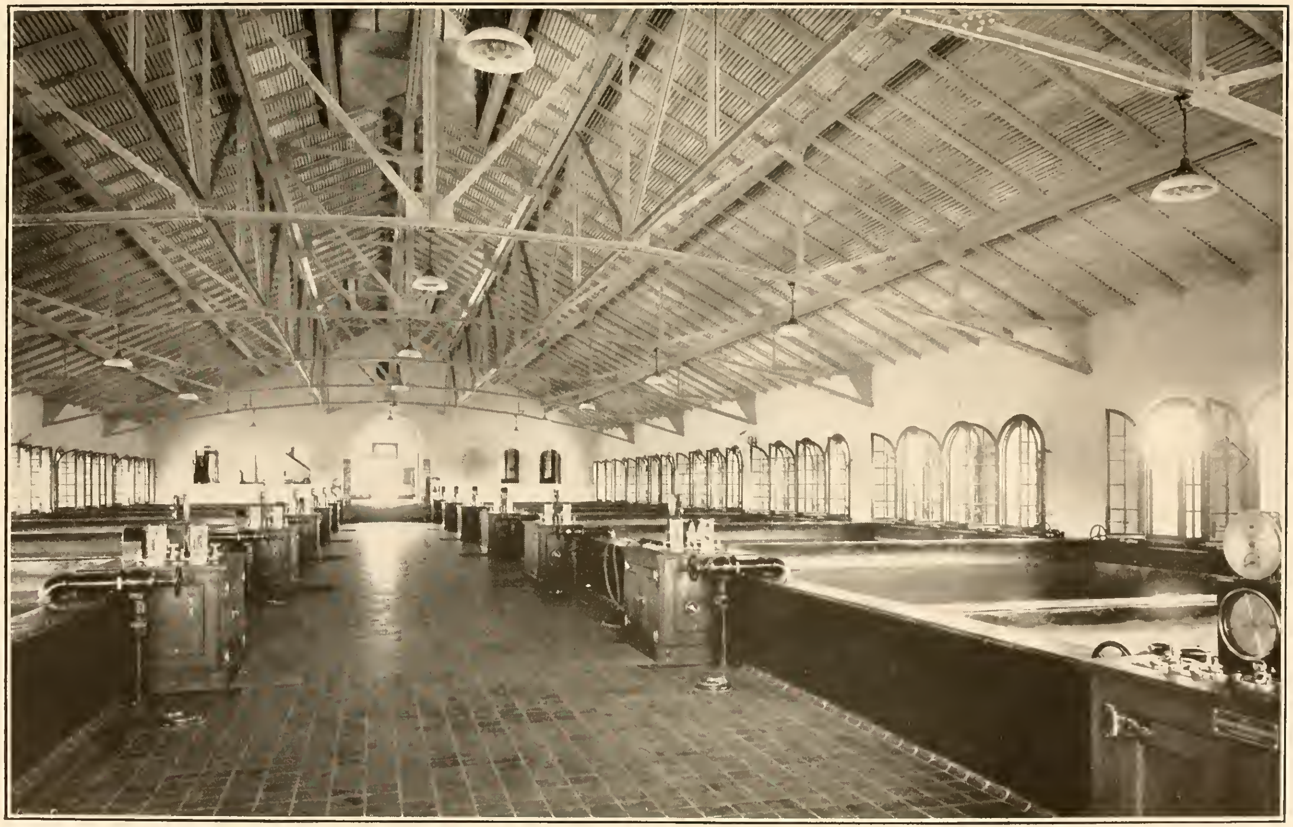


MIRAFLORES WATER-PURIFICATION PLANT SHOWING FILTER BUILDING, LABORATORY, SEDIMENTATION BASIN, AND HEAD HOUSE. MAY 17, 1915.

PLATE 30.



MIRAFLORES WATER-PURIFICATION PLANT. SEDIMENTATION BASIN, LOOKING TOWARD HEAD HOUSE. MAY 17, 1915.



MIRAFLORES WATER-PURIFICATION PLANT. MAIN OPERATING FLOOR, LOOKING TOWARD LABORATORY OFFICE.
MAY 17, 1915.

APPENDIX B.

REPORT OF THE ENGINEER OF TERMINAL CONSTRUCTION, DEPARTMENT OF OPERATION AND MAINTENANCE.

Balboa Heights, Canal Zone, *July 15, 1915.*

Sir: I have the honor to submit the following report of work performed by the division of terminal construction during the fiscal year ended June 30, 1915.

ORGANIZATION.

The work is being executed by the following organization:

(*a*) A designing and office engineering force at Balboa Heights. Attached to this office also are the assistant engineers in immediate charge of the design and inspection of the fuel oil plants and the inspection of the floating cranes.

(*b*) The Pacific terminals construction subdivision, charged with the construction of shops, dry docks, coaling plant, wharves and piers, Naos Island Breakwater, handling of the rock and sand service, and the inspection of work pertaining thereto.

(*c*) A subdivision charged with the construction of the Cristobal coaling plant, Atlantic terminals, and the inspection of contract work pertaining thereto.

(*d*) A subdivision charged with the construction of the east breakwater, Atlantic terminals.

(*e*) The subdivision charged with the construction by the Panama Railroad of Pier No. 7 Atlantic terminals, also reports to the engineer of terminal construction on engineering matters.

During the past year the following changes in organization have occurred:

Effective October 31, 1914, Ancon quarry and the Chame sand service closed down active operations.

Effective November 1, 1914, the work at Balboa under the landscape architect was transferred to the municipal division.

Effective November 10, 1914, the Culebra drafting force of this division was moved to Balboa Heights and consolidated with the drafting force of the office engineer.

On April 6, 1915, the drafting force of this division, reporting to Assistant Engineer W. Rowland, was moved from Corozal to Balboa Heights and consolidated with the drafting force of the office engineer.

DESIGN AND OFFICE ENGINEERING.

Coaling Plants, Dry Docks, Floating Cranes, and Radio Stations.

Designing and office engineering in connection with the dry docks, coaling plants, floating cranes, and radio stations has continued under the supervision of Civil Engineer F. H. Cooke, United States Navy, as designing engineer, with a force of assistant engineers and the necessary assistants.

COALING PLANTS.

The last annual report contained the proposals received under Circular 763 for the coal-handling machinery and accessories of the Cristobal and Balboa coaling plants, and stated that the contracts were entered into with the understanding that both plants were to be enlarged. A description of the characteristics and operation of both plants was also given. The design of the supporting substructure of the Cristobal coaling plant wharf proceeded, with Assistant Engineer Carl Monniche in immediate charge; at Balboa the design of the substructure was divided, Assistant Engineer A. R. Brown under Mr. Cooke having in hand the supports for the berm crane runways and adjacent retaining walls, while the design of the unloader and reloader wharves was assigned to Assistant Engineer W. Rowland in connection with his other wharf work. The design work for the Balboa coaling plant, performed by Mr. Cooke's office, included the modification of the berm cranes, to adapt them for the coaling plant. Contract for the steel for the deck of the Cristobal coaling plant wharves, amounting to about 5,500 tons, was entered into on September 25, 1914, with the United States Steel Products Co., at 0.01967 cent per pound, delivered. The contract required the delivery of approximately two-fifths of the material by January 8, 1915, and the balance by March 15, 1915. The erection was contracted for locally for $5.43 per ton.

Some of the supporting cylinders carry very heavy loads; thus, for cylinders "C," which support the bridge track on the unloader side, the maximum load is 1,070,000 pounds. For cylinders "M," which support the bridge track on the reloader side, the maximum load is 1,150,000 pounds. The cylinder receiving the smallest load is "P" on the reloader wharf, 541,000 pounds. The cylinders are 6 feet in diameter and are reinforced with six or eight longitudinal 70-pound rails, the more heavily loaded cylinders having eight rails. The tops of the cylinders are heavily banded, and in addition spiral reinforcement is provided at each cylinder top, the spirals for the more heavily loaded cylinders being 36 inches diameter by 6 feet long, the other spirals being 30 inches diameter by 5 feet long. The cylinders are capped with steel bearing slabs for the reception of the steel framing, which slabs vary from 24 by 36 by 4 inches thick to 36 by 36 by 5 inches thick. The steel girders and beams of the deck framing are incased in concrete and support a reinforced concrete deck slab, the normal thickness of which is 14 inches, capable of sustaining a uniformly distributed live load of 750 pounds per square foot. The rails for the unloaders and the stocking and reclaiming bridges weigh 135 pounds per yard; for the reloaders 100 pounds per yard; and for the reloader trailer 90 pounds per yard. The arrangement of the framing and slab reinforcement is such that the reinforcement is parallel to the rails. Bumping posts are provided where required. Snubbing posts are provided at 60-foot intervals. The wharves will have a fender system of creosoted timbers and piling. The deck and flange ways for the wheels are drained at frequent intervals. It is proposed to construct reinforced concrete partition walls to separate the individual storage areas according to the allotments to be made; these partition walls will be 13 feet high, of inverted T section, the width of base being 10 feet. At the close of the fiscal year working drawings had been issued for all of the substructure at Cristobal, except for a small portion of the deck slab of the end wharf and for the partition walls.

The supports for the berm crane tracks of the Balboa coaling plant consist for the most part of steel girders arranged in pairs supported by concrete piers, spaced 25 feet apart center to center. The piers supporting one of the tracks also support the conveying system viaduct which parallels the berm crane travel by means of a pier of buttress form extending above the main pier. These buttress piers also support the reinforced concrete curtain walls which confine the coal, the tops of these walls being 14.5 feet above the tops of the rails on which the berm cranes run. This pier and girder construction covers that part of the storage pile intended for subaqueous storage, a length of about 300 feet, and also a distance of about 200 feet to the west of the subaqueous storage where deep foundations were necessary. For the balance of the unloader travel, the total length of which is about 800 feet, the rails are supported on continuous concrete walls founded on rock or rock fill. At the close of the year all of the construction drawings had been issued for the berm crane supports and adjacent retaining walls and for the modification of the berm cranes, except for a few minor details.

As described in the last annual report, two contracts were let, the larger, under W. 40483, with Augustus Smith, for all of the coal-handling machinery and accessories except the unloaders; the smaller, under W. 40587, with the Hunt Construction Co., comprising only the unloaders. It was necessary to make certain modifications in the latter contract to adapt the unloaders as bid on the conveying system proposed by Augustus Smith, and supplemental agreement, dated December 31, 1914, was accordingly entered into with the Hunt Construction Co. whereby the original contract price was increased in the amount of $36,000 on account of these modifications.

On account of the enlargement of the storage pile at each plant and also on account of subsequent modifications in the design of the reloaders in the nature of improvements on the design originally proposed, supplemental contract, dated January 29, 1915, was entered into with Augustus Smith providing for a total increase in the contract price of $366,711.45, made up as follows:

Item 4. For changes in and additions to two duplex stocking and reclaiming bridges for the Cristobal plant only	$60,451.76
Item 9. For changes in and additions to six reloaders, four for the Cristobal plant and two for the Balboa plant	81,822.10
Item 12a. For changes in and additions to two conveying systems and power substations, each complete with all accessories, including wharf bunker, one for the Cristobal plant and one for the Balboa plant	224,437.59
Total	336,711.45

The following is a list of the principal changes:

Item 4—Stocking and reclaiming bridges.—The span was increased from 263 to 315 feet; the clearance to the bottom chord was increased 5 feet, the power and lighting distribution systems were combined, and the voltage increased to 2,300; track clamps were eliminated; the maximum unit stresses in structural steel and rivets were increased; the percentage to be added for impact of moving cars was reduced, each with attendant structural, mechanical, and electrical changes occasioned thereby, the guaranteed over-all capacities being not reduced.

Item 9—Reloaders.—The width of wharf required was reduced, thereby diminishing the cost of substructures; track clamps were eliminated; the power and lighting distribution systems were combined; the hinge of the delivery boom was changed to a point outside the tower, thereby obtaining a greater vertical range of delivery within the limiting operating inclinations; the delivery chute was made of closed section and is operated, in part, by a single "A" frame or split boom rather than by independent booms, thereby increasing the safety and convenience of operation and the range of discharge; the receiving hoppers were modified to correspond to the changes in the viaduct, each with attendant structural, mechanical, and electrical changes occasioned thereby; the effect of all being to improve the reloaders as respects range and control of point of delivery, the capacities remaining undiminished.

Item 12a—Conveying systems and power substations.—The Cristobal viaduct was enlarged to embrace the enlarged coal pile and was increased in height; the Balboa viaduct was lengthened to correspond to the lengthened coal pile but reduced in width and height; the Balboa cars were changed to single side dump; additional cars were added at each plant to obtain the guaranteed over-all capacities with the enlarged coal piles; the wharf bunkers were modified to better conform to the substructure; the Cristobal wharf bunker was further modified to permit the passage of the supply conveyor beneath it, and the location of the storage tracks and substation was changed, thus reducing the cost of substructure; a roof was provided for each wharf bunker and a tower was added to support the supply conveyors; the electrical supply to the substation was changed to 2,300 volts; the lighting of the viaduct was improved by respacing the lamps, each with attendant structural, mechanical, and electrical changes occasioned thereby, the guaranteed over-all capacities being not reduced.

A number of additional applications have been received during the year from coal companies for storage space. No assignments of storage space had been made to the end of the year. Circulars relating to the rental of storage areas and to the charges for handling coal were drafted during the year but have not yet been issued. In May an understanding was reached between The Panama Canal and the Panama Railroad by which the permanent plants, when completed, will be turned over to the latter for operation and maintenance. At the same time the method by which the selling price will be reached was determined. It is expected that the Cristobal plant will be ready for partial operation in September, 1915, and will be completed early in 1916. The Balboa plant will not be completed before July, 1916.

DRY DOCK NO. 1.

Assistant Engineer A. R. Brown has continued in immediate charge of designing and the preparation of plans in connection with Dry Docks Nos. 1 and 2. The design of the dry dock structure was largely dependent upon conditions developing during the progress of excavation. At the beginning of the year the excavation had progressed far enough to enable the concrete work to be designed. During the year construction drawings were developed and issued for the greater part of the dock structures proper and of the adjacent entrance pier, which will form a part of Dry Dock No. 2 when that dock is completed.

The general dimensions of Dry Dock No. 1 are as follows:

Width of entrance	feet	110.0
Width in body at floor	do	113.0
Width in body at coping	do	143.0
Length on center line from point of miter sill to head	do	1,044.0
Length on center line from outside of masonry at entrance to inside of head, feet		1,110.0
Elevation of top of blocking 4 feet 6 inches high, referred to mean sea level		−35.0
Elevation of miter and caisson sills, referred to mean sea level		−39.5
Elevation of coping, referred to mean sea level		+16.5
Volume of water contained, with tide at mean sea level, elevation 0.0, cubic feet		5,265,000

The dock is founded on rock, which for the most part is hard, but which contains soft spots where decomposition has occurred of relatively small proportions. The body of the dock consists essentially of two parallel gravity walls connected by a semicircular head; the floor of the dock is merely a smooth skin laid over the rock exposed by the excavation. The minimum thickness of the floor is 1 foot, the thickness being increased to as much as 5 feet where some of the soft pockets occur. The floor is level longitudinally and for the middle 66 feet of its width; between this level middle part and the side walls, a distance of 23 feet 6 inches, the floor has a fall of 6 inches, making the elevation of the top of the gutter, which is formed at the base of each side wall, minus 40.

The side walls are of gravity section, reinforced at their backs with 70-pound rails, spaced 4 feet center to center for the lower portion of the walls and 8 feet center to center for the upper portion to within 13.5 feet of the coping level. Alternate rails 8 feet apart in the lower part of the wall are embedded about 6 feet in the rock. The walls are set in parallel trenches excavated to an average depth of 12.5 feet below the dock floor to enable the flooding and draining culverts to be formed within their bases as well as to afford an abutment for the thrust. The walls average 29 feet 6 inches in width at the base and are 12 feet thick for the upper 20 feet of their height; the working faces are formed into four altars each 3 feet in width, the height of the altars beginning at the coping (elevation plus 16.5), being 20 feet, 4 feet, 4 feet, 8 feet, and 20 feet to elevation minus 39.5. The lower 20 feet is battered 20 on 3. In order to prevent hydrostatic pressure behind the walls, a drain is formed at elevation minus 27.5 on the back of each wall, which communicates with the dock body by four 8-inch diameter pipes through each wall. The back drains are formed in the concrete and are 12 inches wide by 14 inches deep, covered with concrete slabs each 2 feet long, the slabs being set with 1-inch openings between them. Each slab also has two 2-inch holes. The slabs are reinforced and are 5 inches thick. The back fill rests on the slab covers. The dock ends of the 8-inch drain pipes are closed by brass nonreturn valves accessible from the dock floor to prevent flooding the back fill when the dock is flooded.

Four stairways are provided from coping to dock floor on each side of the dock—one at the entrance, one at the head, and two intermediate. The intermediate stairways are combined with material slides; all of the stairways give access to each altar. Provision is being made for keel blocks (center line blocks), docking keel blocks, and sliding bilge blocks. The keel blocks will be of cast iron, topped with white oak, the lower half of the docking keel blocks will be Demerara greenheart and the upper half will be of white oak; the sliding bilge blocks will be of white oak for the most part. The detail of the blocking and its attachment to the floor will be such as to obstruct travel over the floor a minimum.

Extending completely around the dock and connecting to tracks on the entrance pier and on Dock No. 13 will be a 22-foot gauge track for a 50-ton traveling crane of 87 feet reach, advantage being taken of the semicircular head for the support of 1 rail. The outer rail will be supported on a curved concrete wall paralleling the semicircular head, and on plate girders and concrete piers paralleling the side walls. Special provision will be made for the support of other curves and turnouts. The piers supporting these girders are 4 feet square and 27 feet 9 inches center to center. The inner crane rail along the side walls is also used as one rail of a standard 5-foot gauge track.

A row of capstans and bollards parallels each side wall at a distance of 40 feet from the coping. There are nine capstans for the dry dock proper, two at the entrance, one at the head, and three intermediate on each side. The bollards are spaced 55 feet 6 inches center to center. A capstan replaces a bollard when the spacings coincide. The capstans will be electric driven and will develop a rope pull of 35,000 pounds at a speed of 30 feet per minute. No metal nosings have been provided for the coping, altars, or stairs, the concrete being rounded to minimize chipping. The normal closure of the entrance is by a pair of steel mitering gate leaves. The steel structure is identical with that of the lock gates, except for details at the ends, but the bearing surfaces at the miter and quoin ends are to be of Demerara greenheart instead of nickel steel as in the lock gates. The miter sill and hollow quoins are of granite; thus the bearing is greenheart on granite everywhere, except for the lower 3 feet 10 inches at the quoins, where the bearing is between steel and granite. The gate will be operated by two miter gate moving machines identical with those in the locks. No miter gate forcing machine is being provided. The handrail at the top of the leaves is removable for the more convenient handling of lines, but the lifting and lowering feature provided for these handrails in the locks is not provided, since the absence of towing locomotive tracks renders it unnecessary.

Outside the miter-gate sill is a seat for the floating caisson purchased primarily for service in the locks. This seat is faced with granite similar to the gate sill and hollow quoins. The caisson seat is reinforced by structural steel brackets embedded in the masonry; these brackets extend only to within about 20 feet of the coping level, the masonry above this point resisting the caisson pressures unassisted. The availability of the floating caisson has rendered the use of a miter gate practicable, since the gate can be unwatered when necessary. The caisson is provided with a pumping plant of considerable capacity, so that it can not only unwater the space between itself and the gate, but can also unwater the entire dock if necessary.

A rudder pit 8 feet wide by 20 feet long is provided on the center line of the dock near the entrance. The dock will be provided with a removable chain handrail extending completely around the coping, and the usual accessory cleats, hooks, etc., will be fitted.

The dock is flooded through a culvert formed in the base of each side wall. These culverts communicate with the sea, each by twin openings 8 feet wide by 12 feet high with their bottoms at elevation minus 24.5. On the south side the flooding water passes through the pump suction chamber. On the north side the flooding culvert descends to the lower level after passing the gate recess.

The floor of the suction chamber and of the lowest portion of the side-wall culverts is at elevation minus 52, the descent being made on 45° slopes. The suction chamber is 22 feet clear width, 12 feet high, and about 80 feet long.

The floor of the side-wall culverts rises from elevation minus 52 near the entrance to minus 50 at the head end. The maximum culvert area is 117 square feet, the mean area is 103 square feet, and the minimum area is 89 square feet, each of these areas obtaining for approximately one-third the length. Each culvert communicates with the dock body by 17 grated openings 55 feet 6 inches center to center, each having a net discharge area of 15 square feet. These openings join the culverts below the roofs of the latter. A 6-inch diameter air outlet is therefore provided at each floor grating. It is expected to flood the dock with tide at mean high water in not more than 30 minutes. The water content of the dock is about 6,200,000 cubic feet under these conditions, and the average velocity of flow through the gratings is about 6.75 feet per second. The north and south wall culverts are connected by a crossover culvert 64 square feet in area, extending under the floor of the dock just inside the rudder pit. This crossover culvert communicates with the suction chamber, and parallel to it is laid a smaller culvert 48 square feet in area also communicating with the suction chamber, which will serve for pumping out Dry Dock No. 2 by the pumping plant of Dry Dock No. 1. The 64 square foot crossover culvert not only permits both side-wall culverts to be active in unwatering the dock, but also permits the dock to be flooded through both side-wall culverts by means of the flooding intakes on one side only, when desired.

Each of the four 8 by 12 foot flooding intakes is closed by a "wagon-body" valve operated by water at a pressure of 300 pounds per square inch furnished by an accumulator provided with the pumping plant. The valve proper consists of a structural steel body provided with four wheels which bear on rails supported by iron castings embedded in the masonry. Each wagon-body valve is provided with an upper and a lower guard valve and an intake screen. Each wagon-body valve is counterweighted so that the operating piston will have to overcome frictional forces mainly. The wagon-body valves are to be controlled from the coping by an operator in a standing position near each pair of valves. Each valve of a pair can be moved independently of the other valve and separate indicators are provided.

Connecting with the suction chamber are three grated openings in the dock floor of 80 square feet clear area each. Water passes directly from the dock to the suction chamber through these openings when pumping out. It is necessary to close these large openings when flooding, to avoid too great an influx of water near the entrance to the dock, with resulting objectionable longitudinal currents. This closure is effected by timber sluice valves each lifted by an hydraulic cylinder similar to those for the flooding valves, except that the flooding-valve cylinders are double acting while the sluice-valve cylinders are single acting. A sluice valve is also provided to close the suction chamber end of the 64 square foot crossover culvert, to avoid eddying currents in this culvert. When Dry Dock No. 2 is completed, two more sluice valves will be required to close the end of the south wall culvert to prevent Dry Dock No. 1 from being flooded when Dry Dock No. 2 is being emptied; provision is being made for these valves. The initial equipment of the dock thus includes 4 sluice valves, which will be increased to 6 when Dry Dock No. 2 is built, all of these sluice valves closing openings into the suction chamber. A sluice valve at the suction chamber is not required for excluding flooding water from Dry Dock No. 2 via the 48 square foot culvert, since the valves which will be installed at Dry Dock No. 2 will be capable of taking pressure either way.

The plant for pumping out Dry Docks Nos. 1 and 2 is located on the south side of Dry Dock No. 1 at a distance of about 100 feet from the entrance wall. This location is not as advantageous for a plant which must pump out two docks as would be a location on the north side of Dry Dock No. 1 in the rear of the head wall of Dry Dock No. 2, but this latter location was not available by reason of other demands on this area.

The pumping plant consists of 4 main pumps, 2 drainage pumps, and 1 bilge pump, all located in a rectangular pump pit about 100 feet long by 35 feet wide. The main pumps draw water from the suction chamber and discharge into a concrete culvert 14 feet wide by 12 feet high which communicates with the sea by two openings each 8 feet wide by 12 feet high. Provision is made for closing these outlets when required, and each is provided with a screen. The main discharge culvert is built into the south wall of the pump well. The drainage pumps draw from a duct communicating with the suction chamber and discharge through an independent concrete duct 3 feet square. The drainage pumps have connections for pumping out the main discharge culvert or the pump well itself when required. The bilge pump is intended to remove any water finding its way into the pump well. It has only a suction opening, i. e., no suction piping, and discharges into the drainage pump discharge. All suctions are protected by gratings.

Each main pump is a single impeller, single bottom suction, vertical shaft, volute centrifugal pump of 54-inch discharge diameter. The average overall capacity of each pump is to be not less than 11,000 cubic feet of sea water per minute, and each is driven by 1,000-horsepower, 3-phase, 2,200-volt induction motor located vertically over the pump and connected thereto by vertical transmission shafting suitably supported and steadied. When all four main pumps are operating together, the dry dock can be pumped out in about 2 hours and 20 minutes, with the tide at mean high water. The main pumps are about 50 feet below the motors. The motors are supported on a steel framed floor above the coping level. Each main pump is provided with an hydraulically operated suction and discharge valve, and with a nonreturn valve in the discharge line.

The drainage pumping units are similar to the main units in general construction and operation. Each has a discharge opening 20 inches diameter, an average capacity of 1,200 cubic feet of sea water per minute, and is driven by a 200-horsepower motor. The drainage pumps are set about 15 feet lower than the main pumps. The drainage motors are supported on the same floor that supports the main motors. Each drainage unit is provided with an hydraulically operated suction and discharge valve and with a nonreturn valve in the discharge line. Other valves, some hydraulic and some hand, are provided in the drainage suction and discharge piping. The bilge pump has a discharge opening 3 inches diameter, a capacity of 25 cubic feet of sea water per minute, and is driven by a 220-volt motor at the main pump floor, about 53 feet below the motor floor. Of the 19 valves for the main and drainage pumps all but 3 are hydraulically operated from a control board conveniently located at the motor floor. The degree of closure of each of these valves is indicated by colored lights at the control board. The maximum time required for one full stroke of the main pump valves is three minutes, and for the other valves it is two minutes. A separate control board is provided for the sluice valves hereinbefore referred to. This board is located in the pump house and is also provided with indicators. The pressure water is supplied by a motor-driven accumulator plant located in the pump well. Provision is made for handling weights into and out of the pump pit, advantage being taken of the structure of the discharge culvert to obtain a floor about 20 feet below the motor floor accessible from above by a continuous opening about 20 feet wide and of the length of the motor floor. This opening also admits light and air to the pump pit.

Immediately adjacent to the pumping plant is the permanent compressor plant, which consists of one 2,250-cubic-foot and one 5,500-cubic-foot motor-driven compressor. These compressors are primarily for the shops, but they will also supply air for the various operations around the dry docks. The compressors and pumping plant will be housed in one building about 245 feet long by 60 feet wide. This building will have a structural steel frame, concrete walls, and tiled roof, and it will be provided with a 20-ton electric traveling crane, serving both the compressors and the pumping plant. The switchboard for the control of the pumps, compressors, and the capstans on the south side of the dock will be continuous and will be located in a 60 by 30 foot ell of the combined pump and compressor house.

Provision has been made in the masonry over the suction chamber for the future emplacement of a salt-water pumping plant for a separate system of salt-water piping to serve the dock and adjacent territory. At present this separate system is not being installed. The dry dock will be provided with fixed tile gauges similar to those used in the locks for indicating the depth of water over the floor. Adjustable gauges will also be provided for indicating the depth of water over the blocks, the adjustable feature being required to correspond to the variable height of the blocking.

The granite for dry dock No. 1 was advertised under Circular 857, the following bids being received:

Bidder.	Unit price (cubic foot).	Time of delivery.
		Days.
Stone Mountain Granite Co., Stone Mountain, Ga	$1.90	75
Rockport Granite Co., Rockport, Mass	2.10	120
Sargent Granite Co., Mount Airy, N. C	2.10	130
California Granite Co., Rocklin, Cal	2.75	150
David M. Andrew Co., Baltimore, Md	2.75	Not stated.
Veilmeyer & Lapish, Woodstock, Md	4.01	90

The quantity of dressed stone required is about 11,500 cubic feet. Award was made to the Stone Mountain Granite Co., of Stone Mountain, Ga., at a unit price of $1.90 per cubic foot for dressed stone. The contract also included the furnishing of 750 cubic feet of rough stone at a unit price of $1.40 per cubic foot. The granite has been delivered and is being worked into place.

The pumping plant was advertised under Circular 891, and the following bids were received:

No.	Bidder.	Price bid.			
		Item 1.	Item 2.	Item 3.	Item 4.
1	Alberger Pump & Condenser Co., 140 Cedar Street, New York, N. Y	$147,845			
2	Allis-Chalmers Manufacturing Co., Milwaukee, Wis				$179,000
3	Hanscom Construction Co., 70 Kilby Street, Boston, Mass.	153,172	$143,676		
4	Chas. C. Moore & Co., Sheldon Building, San Francisco, Cal	185,000	172,000	$181,539	168,539
5	Poole Engineering & Machine Co., Woodberry, Baltimore, Md	154,500			
6	R. D. Wood & Co., 400 Chestnut Street, Philadelphia, Pa.	144,500	133,000		
7	A. S. Cameron Steam Pump Works, 11 Broadway, N. Y	153,248			
8	Henry R. Worthington, 115 Broadway, N. Y	140,834	129,121		

Under item 1 delivery of all parts, structural, mechanical, electrical, and hydraulic, is included; under item 2 delivery of structural parts is excluded; items 3 and 4 are alternatives to items 1 and 2, respectively. Award was made to Henry R. Worthington under item 1, the contract price being $133,456, the material difference between this figure and the figure shown in the foregoing table being on account of a reduction authorized to be made in a letter accompanying the bid.

The flooding and sluice valves and accessories were advertised under Circular 892. The following bids were received:

Bidder.	Price bid.		
	Item 1.	Item 2.	Item 3.
The Pittsburg Valve Foundry & Construction Co., Pittsburgh, Pa.	$62,500.00		
Alternate A	945.00		
The Poole Engineering & Machine Co., Baltimore, Md	51,225.00		
Alternate A	920.00		
The Seattle Construction & Dry Dock Co., Seattle, Wash	55,000.00	$64,000.00	$59,000.00
Alternate A	1,600.00	1,600.00	1,600.00
R. D. Wood & Co., Philadelphia, Pa	47,500.00		
Alternate A	1 600.00		

Item 1 is based on the use of water at 300 pounds per square inch pressure, item 2 on the use of water direct from the mains (at pressure from 40 to 120 pounds), and item 3 on the use of compressed air at pressures from 90 to 105 pounds per square inch. Alternate A is for bronze piston rods instead of steel. Contract was awarded to the lowest bidder, R. D. Wood & Co., based on item 1 and alternate A, the contract price being $49,100.

DRY DOCK NO. 2.

It was decided during the year not to complete Dry Dock No. 2 and the adjacent repair piers, Docks 10, 11, and 12, until the necessity for same became apparent. This will lessen construction expenditures by about $1,500,000.

This dock when completed will have the following dimensions:

Width at entrance, full height	feet..	72
Width in body at floor	do....	75
Width in body at coping	do....	92
Elevation of sill and floor referred to mean sea level		−22.83
Length on floor from caisson sill to head wall	feet..	366
Overall length on floor from outside of masonry to head wall	do....	381

This dock will be rectangular in plan, the side walls and head wall being of gravity section. It will be provided with a floating caisson which will bear on a granite faced seat. The dock will be flooded by three 36-inch gate valves in each side wall, communicating with culverts formed in the floor and provided with grated openings into the dock. Four sets of stairs will be provided, two at the entrance and two at the head; a material slide will be formed alongside each of these latter stairs. The dock will be provided with two capstans at the entrance, one at the head, and one side capstan on the north side near the head. The north entrance capstan of Dry Dock No. 1 will also serve as the south side capstan of Dry Dock No. 2.

Only the head wall and the south side wall of Dry Dock No. 2 are being built, and this latter wall supports one side of the entrance pier, the remainder of this pier being supported by concrete columns and steel framing. The entrance pier as now being built is 59 feet wide by 350 feet long. It will have a reinforced concrete deck slab and will support a 22-foot gauge crane track and two standard gauge tracks. At its west or sea end there is now to be furnished an electric capstan similar to those around Dry Dock No. 1 for use in handling ships entering Dry Dock No. 1; a similar capstan is being provided on the unloader wharf of the coaling plant nearly opposite the capstan on the end of the entrance pier. None of the valves, capstans, or other mechanical accessories for Dry Dock No. 2 will be installed at present.

RADIO STATIONS.

The last annual report described the general features of the three radio stations, Darien, Colon, and Balboa, which are being constructed on the Isthmus for the Navy Department.

Civil Engineer F. H. Cooke, United States Navy, continued to perform the duties of inspector in charge for the Bureau of Yards and Docks of the Navy Department during the year. The inspection work was under the immediate direction of Supervisor Ira W. Dye and a force of subinspectors. Mr. Dye resigned effective May 7, 1915.

At the Darien radio station, the contractor for the three 600-foot self-supporting steel towers completed the original contract March 30, 1915. This contract is numbered 1948A, between the Navy Department and the Penn Bridge Co., of Beaver Falls, Pa. The original contract price was $112,350, and the total payment to the contractor was $135,455.26. Of the increase over the original contract price, $10,626.96 was for modifications and additions to the tower structures. The work has been accepted and final payment has been made.

During the fiscal year, forces of the building, municipal, and electrical divisions of The Panama Canal completed the buildings, water supply, sewerage, electric installation, and improvement of grounds, as well as the foundations for the towers. The buildings include transformer house, power house, operating building, operators' barracks, quarters for officer in charge and chief electrician, and a storehouse. The permanent water supply is drawn from Gatun Lake by an electrically-driven pump which discharges into a system of piping connected with two storage tanks on a near-by elevation. The necessary hydrants are provided for fire protection. The power supply is 3-phase alternating current at 44,000 volts, which is stepped down to the working voltage within the station.

The radio apparatus and power generating and transforming equipment in the power house were furnished by the Federal Telegraph Co. of San Francisco, Cal. At the close of the fiscal year all of the original construction work had been completed, except a few minor details, and the station was in operation.

At the Colon and Balboa stations the contractor for the two 300-foot self-supporting steel towers at each station completed his work May 12, 1915, for Colon, and May 20, 1915, for Balboa. The contract is No. 2047, between the Navy Department and A. W. Kurz, New York, N. Y., the contract price being $19,955.

The tower foundations, buildings, sewer and water and power installations at each station have been executed by the forces of The Panama Canal and the Panama Railroad. At each station there is a power house, an operating building, operators' barracks, and one set of double quarters for chief electricians. At the close of the fiscal year all original construction had been completed except a few minor details.

On November 9, 1914, the old north wooden mast at the Colon radio station fell while being taken down by contract, resulting in the death of two of the contractor's employees who were on the mast at the time.

FLOATING CRANES.

The two 250-ton floating cranes *Ajax* and *Hercules* are being furnished by contract (W. O. 38272) from the works of the Deutsche-maschinenfabrik A. G. of Duisburg, Germany. Assistant Engineer Henry Schoellhorn, who was stationed at the works of the contractor to approve all plans and inspect all work during construction, has continued in immediate charge of the inspection of erection and tests on the Isthmus.

At the beginning of the year all material for the construction of these cranes had been manufactured at the works of the contractor and shipped to the Isthmus. The *Ajax* left Emden on April

26, 1914, and the *Hercules* followed on May 30, 1914. On leaving, these cranes were complete as regards pontoons and crane towers. No part of the jibs was erected. The bell, the revolving structure which carries the jib, was complete except for the counterweight arm and machinery house. The hoisting machinery and luffing mechanism were not in place. The power plant was complete and in operating condition. The screw spindles, spindle carriage, and counterweight were shipped lashed to the deck of the pontoon. The jibs and the rest of the material, including spare parts and foundry patterns, left Antwerp about the same time. The contract permitted the use of a canal lock for erecting the jibs without charge, except for additional cost of labor, if any. The contractor planned to take advantage of this, and was assigned a building site on the back fill at the east wall of the middle chamber of Gatun Locks for the erection of the two jibs, and suitable storage and wharf space at Dock No. 14, Cristobal, for work on the cranes proper. The material, other than that for the jibs, arrived at Colon on June 4, 1914, and was unloaded and transported to Dock No. 14. This material consisted of structural steel for the bell counterweight arm and machinery house, the mechanical and electrical parts of the hoisting and luffing machinery, wire rope, blocks, and sheaves.

The *Ajax* arrived at Dock 14 on July 8, 1914, in tow of the tug *Thames* of the International Towing Co., Rotterdam, Holland. On July 13 the *Hercules* arrived in tow of the *Schelde* of the same company. The work done at Dock 14 on each crane before attachment of jib included the following: About 88 long tons of structural steel for bell, counterweight arm, carriage countertrack, machinery foundations, and machinery house were erected and riveted. The screw spindles, spindle carriage, luffing mechanism, and hoisting machinery were installed. The remaining work to be done on the power cables and control wiring, that is, the wiring from slip rings to machinery house and operator's cabin, was completed. The bell counterweight, consisting of 150 tons of scrap iron, sand, and cement, was built about the steelwork of the counterweight arm. When the luffing mechanism had been tested and found to operate satisfactorily, the cranes were ready for the attachment of the jib. The *Ajax* reached this stage of completion on October 2, 1914, and was towed to Gatun and placed in the lock chamber. On November 4 the *Hercules* followed. The material for the two jibs, which consisted of about 320 long tons of structural steel, on arrival was shipped to Gatun, and, after a delay of 12 days, erection was begun. The jibs were erected at right angles to the chamber wall with the pivot end toward the chamber. No part of the jib was permitted to project over the lock chamber wall. The jibs were erected on cribbing of sufficient height and so placed that the passage of towing locomotives along the lock wall was not interrupted. In order to make the attachment to the crane structure, it was necessary to move the jibs until they projected 45 feet beyond the lock wall. When completed, each jib was lowered upon four roller supports so that the lower chords of the jib rested upon them. Two of these supports, each consisting of two 18-inch rollers, were placed at the pivot end of the jib near the edge of the lock wall. The two other supports, which were placed about 60 feet from the sheave head of the jib, were constructed with one roller only. The lower chords of the jib were fitted on the under side with blocks of elm 10 inches thick and armored with three-eighth inch steel plate for the full width of the chord. It was found that at the one-roller supports this lining was not sufficient to protect the outstanding legs of the chord angles. When reinforced with a three-fourth inch plate the result was satisfactory. The jib was moved by means of 2 sets of 7-part block and tackle placed between the head of the jib and deadmen anchored at the lock wall and leading to two hand winches.

When everything was ready, the crane to which the jib was to be attached was brought into the lock chamber and the water lowered until the pivot jaws of the crane superstructure were level with the pivot holes of the jib. Alignment in a horizontal plane was obtained by shifting the pontoon by means of the mooring lines. The jib was then skidded forward and the pivot pins were inserted. In order to secure the nice adjustment necessary to line up the holes for the insertion of the pivot pins, hydraulic jacks, placed upon the roller supports and acting upon the lower chord of the jib, were used. After the jib was thus pivoted, it was raised into place by its own luffing mechanism. To accomplish this, since the jib in its outer position lacks about 30° of reaching a horizontal position, it was necessary to add an extension to the connecting links that transmit the motion from the spindle carriage to the jib. The jib was then derricked up in the usual manner by lowering the spindle carriage. In this position, the jib was secured to the superstructure by special rigging designed for that purpose and the connecting links released to enable the extensions to be removed. When they were removed, the spindle carriage was raised sufficiently so that the connecting links could be pinned to the jib. The *Ajax* finished this operation on October 16 and was towed back to Dock 14 to receive the running cable and be adjusted for the acceptance tests. The *Hercules* finished the attachment of the jib on November 8, 1914.

With the contractor's consent, both *Ajax* and *Hercules* were docked in the upper chamber of the east locks at Gatun by the mechanical division from November 9 to 13, 1914, and their bottoms were cleaned and painted.

On November 14, by means of a locomotive crane on the lock wall, the spindle carriage counterweights were placed on the *Ajax* and it was ready for service. The *Ajax*, under the direction of the mechanical division and manned by a crew of the contractor's employees, was then taken to Gaillard Cut to remove two portions of a sunken drill barge that were blocking the channel. After successfully removing these obstacles and performing some minor work the *Ajax* was returned to the contractor at Dock 14 on November 25, 1914. The *Hercules* was returned to the contractor on November 16, 1914. The contract required The Panama Canal to provide the weights, slings, lines, and unskilled labor necessary for the tests and to attach and detach the test loads to hooks. The test load for the main hoist was built up of two concrete blocks in which 15-inch I beams are embedded and which project beyond either side. The load is suspended by four 6 by 2 inch eyebars, which at their lower ends are pinned to the side girders and at their upper ends to a shackle through which the 250-ton triangle is passed. The test load described weighs 100 long tons, and by the addition of cast-iron blocks and steel rail for fractional weights the load can be gradually increased to the maximum required—300 long tons. The test load for the auxiliary hoist is a steel platform filled with concrete and suspended at the four corners by 1¼-inch chain. It weighs 8 long tons.

The contractor offered the crane *Ajax* for test on December 1, 1914, and the main hoist test load was assembled so that the actual test could begin on December 3. The test with the 100-long-ton normal load was completed successfully, and the speed of the hoisting, luffing, and slewing operations met contract requirements. On December 7 the test load was increased 20 per cent, as specified by the contract for the overload tests, by the addition of steel rail. The 120-ton load was hoisted clear of the wharf and luffed slowly out to the 100-ton reach of 81.6 feet from the face of the fender. No sign of distress was noticed in any member. The auxiliary hoist trolley was at the inner limit of travel, when it should have been at the tip of the jib. The jib was ordered to be luffed in, so that the crab could be run out. The instant that the controller was placed in the luffing position and the brake solenoids were heard as they released the brakes on the drums, two movements were observed; first, the collapse of the back of the jib and fall of the load, which was only a short distance above the ground; a pause, and secondly, the fall of the jib and the recoil of the pontoon. The jib pivot remained intact, and the jib in its fall turned about this pivot. The head of the jib with the sheaves which support the main load swung clear of the test load and buried itself about 6 feet in the ground. The extension of the jib beyond the point which serves as an attachment for the crab-trolley sheaves struck the test load and was completely wrecked. The portal which ties the upper chord together at the second panel point and supports the guide sheaves for the main hoist remained in place. The connecting links from the jib to crosshead were badly twisted. The back spindle carriage track was sprung outward and with it the two spindles. The spindles, however, were found to have suffered no injury. The upper chord was sprung and the lower chord twisted. The main hoist blocks and the equalizer bar received injury, more especially the latter, but the block sheaves were intact. One main block triangle was badly bent. Of the upper sheaves at the head of the jib only 2 of the 10 were broken. The ladders, walks, railing, etc., had been bent. The crab track was badly twisted and bent. The jaws of the revolving superstructure which form the jib pivot were twisted, and the outer cover plate was ripped. The inner part of the crab track penetrated the operator's cab and injured the controllers and instruments. The hoisting rope was kinked in places and rendered unfit for use. No one was injured.

Investigation of the accident led to the conclusion that the heel strut, member No. 29, was the first to fail and that the failure was probably due, not to insufficient sectional area to resist the maximum direct compression, but to the distribution of metal in this member and to the insufficient strength of latticing and tie-plates, and of rivets connecting these details to the main members, as well as failure to provide adequately for flexure as well as direct compression. The contractor did not concur in the above stated cause of failure, and while stating he did not know the cause of the accident, expressed such confidence in his design that on December 10 he offered the *Hercules* for contract tests. The Panama Canal was unwilling to permit this to be done without his first reinforcing certain members of the jib. The reinforcement of three members of each truss of the jib of the *Hercules* was begun on January 11 and was completed January 27, 1915.

During the period from December 10, 1914, when the *Hercules* was offered for test until January 11, 1915, when work in reinforcing the jib was begun, the crane was available for service up to 60 per cent of its rated capacity. The crane was used by the contractor in removing the jib of the *Ajax*. When the reinforcing was finished, the *Hercules* was offered for test. The tests were discontinued on January 29 on account of vibration in the screw spindles at certain positions when operating under load. The contractor was engaged in remedying this matter, when on February 16 The Panama Canal required the crane in Gaillard Cut. After 29 days' use the crane was returned to the contractor at Dock 14 on March 17 and the tests were resumed.

The tests were completed satisfactorily on March 27, 1915, and on March 30 the *Hercules* was accepted by The Panama Canal with a few minor exceptions, and turned over to the mechanical division for operation. Since taking over the crane, it has been fitted up by the mechanical division with living quarters for the crew, a galley, and other necessary equipment.

The contractor was entirely responsible for the accident to the *Ajax*, and on December 27, 1914, as soon as the extent of the damage could be ascertained, his local representative cabled to his home works for an entire new jib with connecting links, excepting only such minor parts as sheaves, walks, etc., that had escaped damage. New wire rope was ordered for both main and auxiliary hoists and the trolley, a new front for the operator's cabin, and electrical and mechanical parts to replace those which had been injured in the operator's cabin. In building the new jib the contractor was required to strengthen certain members similar to the reinforcing of the jib of the *Hercules*. The mill and shop inspection of the new jib was intrusted to the Germanic Lloyd Inspection Bureau. The new jib was completed at the works of the contractor on April 15. On May 8, the structural steel for the jib was shipped from Rotterdam on the steamship *Cornelius*, was reloaded at New York, and arrived at Colon on June 10, 1915. The second shipment, including the wire rope and mechanical parts, left Rotterdam in May and arrived at Colon June 18. The final shipment, consisting of the electrical parts and the main engine crankshaft, arrived on the Isthmus on June 24, 1915. The contractor will erect and rivet the jib in two parts upon the ground at Dock 13, Cristobal, and then hoist them into place on the crane superstructure by the *Hercules*. The jib was about 25 per cent erected at the end of the year.

BALBOA DOCKS AND PIER.

Assistant Engineer W. Rowland continued in immediate charge of design and office engineering connected with the Pacific terminal docks and pier during the year. The work of this section included the following: Plans were completed for the small boat landing of concrete and steel for the quarantine station, Dock No. 1. This dock will be furnished a 90-foot gangway bridge and a suitable landing pontoon. Comparative designs were made for fuel-oil crib, Dock No. 2. The design adopted for crib "C," of which the deck measures

62 by 62 feet, includes nine supporting 6-foot cylinders and two inclined 4-foot brace cylinders, with reinforced-concrete deck beams and slab. For any future crib construction it is expected to develop a rectangular reinforced-concrete caisson, to be built in the dry and sunk after being towed to its site.

A general layout for the reloader wharf, Dock No. 6, 745 feet in length by 64.2 feet in width, was approved in August, 1914. Working drawings were not started until February, 1915, owing in part to delay in obtaining information from the contractor for the coal-handling machinery regarding wheel loads and similar data. For the substructure, 6-foot cylinders with steel forms sunk to rock were adopted except under the wharf bunker, where eight 8-foot diameter cylinders will be used on account of the heavy loads. The deck will consist of steel longitudinal and cross girders with a reinforced-concrete slab. The cross girders have been assumed to be continuous over three supports. The plans of the steel deck were completed and requisition was forwarded in June, 1915. Drawings for the bumping post, snubbing posts, pile fenders, anchors, and other details of this dock have been completed.

Five comparative designs were made for the substructure of the unloader wharf, Dock No. 7, 1,052 feet long by 59.5 feet wide. The type adopted in August, 1914, consists of concrete piers, spaced 25 feet center to center, anchored to the rock, extending the full width of the pier, and having a width of 8 feet at the bottom, which is offset to give a width of 6 feet for the upper portion of each pier. These piers carry longitudinal steel girders, which support the tracks, the reinforced-concrete deck slab, and the necessary superstructure of the coaling plant. The details for this dock have been worked out, including conduits for carrying water, air, and electric light and power, laid in the concrete slab to the face of the dock, where outlet boxes will be installed. The plans for Dock No. 13 (formerly "d–e") and Dock No. 14 (formerly "e–f") were completed, including the development of a new type of snubbing post and the adoption of a uniform system of carrying air, water, and electric cables out to the face of the dock, where brass and cast-iron outlet and connecting boxes will be installed, through pipe conduits built in the reinforced-concrete slab. Plans for similar outlet boxes for water, air, and electricity were prepared for a portion of Dock 15 and for Dock 16 (formerly "g–h–i").

During the year a design was developed for reinforced-concrete pontoons for use at the head of slips Nos. 1 and 2, Docks 17 and 19 (formerly "i–j" and "m–n"). It is proposed to use two pontoons about 120 feet long and 28 feet wide at each dock. Four gangway bridges were ordered and have been delivered. Two are in use in connection with a temporary steel pontoon in Slip No. 1. The details of the pontoon mooring were completed. At the end of the year the drawings for the pontoon had not been approved. Drawings for additional anchors for Pier No. 18 and for decking over the center portion of this pier were completed and approved. In February, 1915, a decision was reached in regard to the type of accessories with which the pier shed should be fitted for handling cargo. This enabled the steel frame of the pier shed to be designed. The plans and specifications were completed in April, and the contract was awarded to the Riter-Conley Manufacturing Co. on May 7, 1915. Specifications for the sliding sectional doors for this pier were forwarded before the end of the year. The drawings for all other details of the pier shed remain to be completed. The pier shed, 160 by 1,000 feet, will have side walls of reinforced concrete, 5 inches thick. The roof will be covered with reinforced-concrete tile similar to the shop buildings. Each side of the pier shed will have extension columns and a line of longitudinal elevated girders similar to the pier sheds at Cristobal. In addition, alternate columns will be fitted with 3-ton 65-foot cargo booms to be operated by electric or steam winches at the dock level.

During the year a berthing plan of the docks at each terminal was prepared showing the berthing space, assigning permanent numbers to the docks, and giving general information.

SHOP BUILDINGS.

Mechanical Engineer A. L. Bell, in charge of design and office engineering connected with the permanent shops, was transferred to the mechanical division effective July 1, 1914. Junior Engineer O. O. Kuentz remained in charge of the completion of the work of this section until he left the Isthmus on June 3, 1915, under orders of the War Department, having received a probational appointment as second lieutenant, Corps of Engineers, United States Army, as a result of passing a competitive examination held on the Isthmus.

COLLIERS.

Work continued on the two Panama Canal colliers *Achilles* and *Ulysses* for which contract was awarded to the Maryland Steel Co. on April 9, 1914. These colliers were constructed under the supervision of the Bureau of Construction and Repair of the Navy Department. The appropriation was not sufficient to equip them with coaling booms, winches, and other equipment that would permit them to be self-discharging. These colliers were found during the trial trip to have ample power to fully meet the contract requirements regarding speed. The *Ulysses* arrived on its first trip to the Isthmus with 12,000 tons of coal on April 27, 1915, and was unloaded under the Brown hoist, in the dry-dock slip at Mount Hope, which had been dredged to receive it. The *Achilles* arrived on the Isthmus with its first load of coal on June 17, 1915. Until the permanent coaling plant is completed these colliers will be unloaded by the Brown hoist at the dry-dock entrance slip. To the end of the year the *Ulysses* had brought three loads and the *Achilles* had brought one load of coal to the Isthmus. These colliers are being operated by the Panama Railroad Company.

TUGS.

The two type A tugs for which the design was made by Mr. M. C. Furstenau of Philadelphia, Pa., and for which award was made to the Staten Island Shipbuilding Co. on May 8, 1914, were named, respectively, the *Gorgona* and *Tavernilla*. On their trial trips at New York in February and April, respectively, the *Tavernilla* developed a speed of 12 knots, and the *Gorgona* 13 knots. The *Tavernilla* arrived at the Isthmus on March 21, and the *Gorgona* on April 27. Some necessary changes were made in these tugs to adapt them to local conditions by the mechanical division. The *Tavernilla* was accepted on April 27, and the *Gorgona* on May 28. These tugs are very powerful. The *Gorgona* developed 1,283 horsepower, and the *Tavernilla* 1,170 horsepower under forced draft during the trial trips. During the test of the *Gorgona* a complete turn of the vessel was made under full power, in a circle of approximately 250 feet diameter, in 1 minute and 30 seconds. The vessel was also brought from full speed ahead to sternway in 45 seconds, and from sternway to headway in 53 seconds. During the test of the *Tavernilla* a complete turn of the vessel was made under full power, in a circle of approximately 250 feet in diameter, in 1 minute and 37 seconds. The vessel was also brought from full speed ahead to sternway in 42 seconds, and from full speed astern to headway in 47 seconds. The tugs have been temporarily turned over to the dredging division for use in Gaillard Cut.

FUEL-OIL PLANTS.

During the year Assistant Engineer F. C. Nichols continued in immediate charge of the design and the supervision of construction of the permanent fuel-oil storage and handling plants at Balboa and Mount Hope until he resigned, effective May 31, 1915. A large part of the construction work was performed for this division by the mechanical, building, electrical, and municipal divisions.

As stated in the last annual report, it is proposed that these plants, located one at each terminal of the canal, shall be able to handle oils from the tank farms to three ships simultaneously, or vice versa, at the rate of 1,200 barrels per hour for each vessel; and also to deliver oil by pipe line at the rate of 400 barrels per hour from Mount Hope to Gatun and from Balboa to Paraiso.

The location and general arrangement of the handling plants, tank farms, oil docks, and pipe-line connections at the two terminals are shown on drawings 4199, 4198, 4197, and 4196. (Plates Nos. 116, 115, 114, and 113.) Construction work commenced on the Pacific terminal plant in July, 1914, and was completed to such an extent as to turn this plant over for operation by the mechanical division on January 12, 1915. At the Atlantic terminal construction work was commenced in August, 1914, and the plant was placed in commission by the mechanical division on February 28, 1915.

Provision has been made at each plant for the installation of three 250-horsepower boilers and three oil-pumping units. The equipment installed in each plant to date is as follows:

Boiler room.—One battery of two 250-horsepower horizontal return tubular boilers, with the necessary auxiliaries, such as boiler-feed pumps in duplicate, boiler-feed water heater, oil heater, and oil feed pumps for forcing oil fuel to the burners. The system of oil piping, however, is such as to enable delivering oil direct to the burners by gravity feed from fuel tanks located in the immediate vicinity of the plant at an elevation approximately 40 feet above the burners. Each boiler is equipped with two 150-horsepower steam atomizing fuel-oil burners of the "Best" type. The boiler settings consist of a structural steel frame constructed of I-beam columns and girders from which the boilers are hung entirely independent of the brick setting. All of the equipment installed in the boiler plants was selected from retired Panama Canal equipment.

Engine room.—Two 20 and 14 by 12 by 18 duplex, tamden-compound, oil pumping units of the outside center-packed plunger type have been installed in each plant. The normal capacity of each pump is 1,200 barrels (50,400 United States gallons) per hour of crude oil with asphaltum base and gravity of 16° Baume′ at 60° F. (temperature of oil at time of handling 80° F.), against a total head (excluding suction) of 150 pounds per square inch with steam pressure of 125 pounds per square inch at the throttle, and 400 barrels (16,800 United States gallons) per hour of oil of a similar grade against a total head (excluding suction) of 250 pounds per square inch.

Each pump is equipped with special features desirable and necessary for the handling of heavy oils, including one suction and one discharge air chamber, connection between oil cylinders and discharge chamber to permit the clearing of entrapped air or gas with the pump in operation, and an adjustable spring pressure relief valve and by-pass pipe designed to automatically permit the oil to escape from discharge pipe to suction pipe should the discharge pressure from any cause rise above the pressure for which the valve is set. Specifications covering the pumps and auxiliary equipment are contained in Circular 854. Contract for the manufacture of four pumps was awarded September 2, 1914, to the National Transit Co., of Oil City, Pa., at a unit price of $3,805, including accessories, such as steam and oil indicating and recording pressure and vacuum gauges, automatic pressure relief valve, and a complete duplicate set of oil suction and discharge valve seats, valves, and valve springs. At the Balboa plant a 750-gallon Worthington underwriters' fire pump, 16 by 9 by 12 inches, selected from old retired equipment, has also been installed for use when required in handling Diesel engine oil.

Manifold.—The two principal objects to be attained in the design of the manifold were:

(*a*) The ability to connect the suction and discharge pipes of any pump with the pipe line to any tank and, at the same time, to permit the manifold to be extended indefinitely to meet the requirements of any additional tanks which may be erected in the tank farm.

(*b*) The ability to receive or deliver oil between the tank farm and three ships simultaneously with or without the assistance of the pumps in the handling plant.

This has been satisfactorily accomplished by a combination of special cast-iron headers, pipe bends, valves, and fittings, the general arrangement of which is shown on drawing No. 4196. (Plate No. 113.)

OIL DOCKS AND PIPE LINES.

At the Atlantic side, Dock No. 13 has been connected with the oil-handling plant by one 10-inch and one 12-inch pipe line, provision being made for the addition of a third line should future demands require it. The two lines now in service at Dock 13 are being extended to the Coaling Pier No. 16 by 10-inch lines laid under the French Canal. After crossing the French Canal the lines will be reduced to 8 inches in diameter and laid along both sides of the coaling plant, with six 8-inch outlets on the unloader wharf, six on the reloader wharf, and two on the end wharf, making a total of 41 outlets at the coaling pier. There are at present four 8-inch oil outlets in service at Dock 13.

At the Pacific terminal a berth for oil vessels 75 feet wide by about 2,000 feet long, immediately adjoining the canal channel about 2,000 feet south of the old French pier, has been dredged to −45, and the necessary dolphins placed. The plans call for three oil cribs, one of which, "C," consisting of a steel and concrete deck 62 feet square supported on nine 6-foot concrete cylinders driven to bedrock, has been completed and placed in service. In order to facilitate deliveries of oils to steamers until additional oil cribs are constructed, a 10-inch oil line is to be laid to the old French pier, where six 8-inch oil outlets, spaced 200 feet apart, will be installed. The installation of the proposed 8-inch oil line from Mount Hope to Gatun has been abandoned, due to the dismantling of the Gatun steam-power plant.

For delivering oil to dredges operating in the Gaillard Cut district, and to supply fuel oil to the Miraflores steam-power plant, an oil line approximately 30,600 feet in length, consisting of 10, 9, 8, and 7 inch pipe, has been installed from the oil-handling plant at Balboa, north to Paraiso, through which deliveries are now being made to tanks erected at Paraiso at the rate of from 300 to 450 barrels per hour. By this line, oil is also delivered to Balboa shops and other points between Balboa and Paraiso. The greater part of the pipe and fittings used in this line was obtained from second-hand material on the Isthmus.

The placing of this line in service by The Panama Canal obviated the necessity of receiving further deliveries of oil into Panama Canal tanks through the Union Oil Co.'s transisthmian line, and upon the expiration of the contract with the Union Oil Co. on December 31, 1914, it was not renewed and the Union Oil Co. was requested to proceed with the removal of their line. This work was practically completed in June.

TANK FARMS.

Lots for the erection of tanks by individuals and corporations are being leased under revocable licenses issued by The Panama Canal.

At the Atlantic terminal all lots are 300 feet square, and the annual rental is $300. At the Pacific terminal, on account of the more restricted area, the tank lots are 280 feet in diameter, for which the annual rental is $300. The above lots will accommodate tanks up to 55,000 barrels capacity. At the Pacific terminal there are a few smaller lots of 230 feet diameter which will accommodate tanks up to 37,500 barrels capacity. The annual rental for these smaller lots is $200 per annum. All material and labor, or work of any nature required in connection with the installation of tanks by private parties, including the grading of tank foundations, construction of fire walls, and installation of pipe lines from their tanks to the Government handling plants, must be supplied by and at the expense of the licensee. Up to the close of the fiscal year revocable licenses for the following lots had been issued:

At the Atlantic terminal.—Nos. 8 and 24 to the West India Oil Co., New York City; Nos. 19, 21, 22, and 34 to the Standard Oil Co. of New York; Nos. 26 and 48 to the Roxana Petroleum Co. of Tulsa, Okla.; Nos. 4, 5, and 28 to the Huasteca Petroleum Co., New York; Nos. 10 and 41 to the Texas Co. of Houston, Tex.

At the Pacific terminal.—Nos. 1, 2, 3, and 4 to the West Coast Oil Fuel Co. (Ltd.), London; Nos. 9 and 10 to the Panama Agencies Co., Panama City; Nos. 13 and 14 to the Roxana Petroleum Co. of Tulsa, Okla.; Nos. 15, 16, 17, and 18 to the Standard Oil Co. of New York.

At the close of the fiscal year the tanks completed or in course of erection by licensees were as follows:

At the Atlantic terminal.—Two 55,000-barrel tanks by the Roxana Petroleum Co.; three 55,000-barrel tanks by the Huasteca Petroleum Co.; two 55,000-barrel tanks by the Texas Co.

At the Pacific terminal.—One 25,000-barrel tank by the Panama Agencies Co. (completed); two 55,000-barrel tanks by the Roxana Petroleum Co.; four 37,500-barrel tanks by the Union Oil Co. (completed).

It is understood that the Union Oil Co. does not intend to maintain its three 37,500-barrel tanks at the Atlantic terminal, and will either dismantle or dispose of them.

The Union Oil Co.'s four 37,500-barrel tanks located at the Pacific terminal will be maintained by the Union Oil Co. on their present locations, and revocable licenses for four 280-feet diameter lots have been issued. Pipe line connections from these tanks to the Panama Canal handling plant at Balboa have been installed by the Union Oil Co.

Estimating that the handling plants would be sufficiently completed to enable handling oil by January 1, 1915, specifications covering the amount and grade of fuel oil desired for use of The Panama Canal during 1915 were prepared in October, 1914, and advertisement for bids was made in the usual manner under Circular 875. Contract for about 450,000 barrels to be delivered at Balboa in cargoes of 60,000 barrels, as required, was awarded to the Standard Oil Co. of California at 92 cents per barrel. The first cargo under this contract was received at Balboa on February 12. For deliveries at the Atlantic terminal, contract was awarded to the Union Oil Co. for the delivery of approximately 117,000 barrels of fuel oil in storage in their Mount Hope tanks, at 95 cents per barrel. The final delivery under this contract into the Panama Canal storage tanks at Mount Hope was completed during May. Since the beginning of operations the oil-handling plants have not only met satisfactorily all requirements outlined in the original proposals, but have demonstrated their ability to handle oils, either way, between vessels and storage tanks in the tank farms at the rate of from 1,800 to 2,000 barrels per hour.

All oils are handled through the Panama Canal's oil-pumping plants for which service a charge, based upon the cost to The Panama Canal and subject to such change as may be ordered from time to time, is made. The present rate is 4 cents per barrel of 42 United States gallons each way to and from storage. In connection with the fuel oil storage and handling plants, plans have been prepared for the erection at the Pacific terminal of one additional 42,000-barrel tank for the storage of Diesel engine oil and for the installation of one 5,000-barrel tank and necessary pipe lines at each terminal for the storage by The Panama Canal of gasoline in bulk. This work had not been undertaken up to the end of the year. The storage in bulk of gasoline, kerosene, or other distillates by private individuals or corporations is not permitted.

CONSTRUCTION WORK, FIELD ENGINEERING, AND INSPECTION.

Pacific Terminals.

General Supt. J. A. Walker has continued during the year in immediate charge of all construction work, including shops, dry docks, wharves, and pier, coaling plant, Naos Island Breakwater, Sosa Hill excavation, the erection of oil tanks and other construction work performed by this division in connection with fuel-oil plant, the operation of Ancon quarry, and the unloading of Chame sand. He has been assisted by Assistant Engineer H. D. Hinman. Mr. Hinman is also in immediate charge of field engineering, and the inspection of all construction and contract work, reporting on such work directly to the engineer of terminal construction.

GENERAL.

There were excavated during the fiscal year 753,821 cubic yards of material. Of this amount 517,217 cubic yards were from Sosa Hill, of which 363,658 cubic yards of rock were for the east breakwater. The remainder was excavated from the dry dock, entrance basin, coal pockets, wharves, and piers, and for other divisions. There were placed in fills and embankments 760,183 cubic yards of material. Two hundred and sixty-nine thousand six hundred and seventy-eight linear feet were drilled and 298,020 pounds of explosives were used in connection with the above excavation. Approximately 20 miles of track were laid and 16 miles removed during the fiscal year in connection with the various pieces of work. A total of 206,077 cubic yards of concrete was placed, 158,744 cubic yards being mass concrete and 47,333 cubic yards reinforced concrete, in which a total of 5,531,574 pounds of reinforcing steel and 1,269,307 pounds of fixed steel were used; 112,407 linear feet of piles were driven. The caisson penetration amounted to 7,484 linear feet. There were erected during the year 4,147.4 tons of structural steel, the greater part of which was for the coaling plant, the dock gates, and wharf superstructures.

STEAM-SHOVEL EXCAVATIONS.

The operation of all steam shovels continued under the direct supervision of Mr. J. A. Loulan, superintendent of excavation, until his resignation on August 8, 1914. Steam-shovel work was performed in the dry dock, entrance basin, coaling plant, Sosa Hill, Diablo Hill, and on various small jobs. At the beginning of the year three shovels were operated. These were working in the entrance basin and in Dry Dock No. 1. One shovel was placed in Sosa Hill in August. Active operations in Sosa Hill began in September, 1914. As the number of shovels in the dry dock decreased the number in Sosa Hill was increased to four, and they were worked on split shifts, making 12 hours a day. The loading of sand and rock had been transferred to this division during the previous year and a shovel was in position at each storage pile and operated intermittently for this service. One shovel was in operation during the early part of the year at Ancon quarry excavating rock for the crushers. This shovel was shut down on October 31, 1914. There were excavated by steam shovels 687,811 cubic yards of material.

DRY DOCK NO. 1.

Excavation.—At the beginning of the year the excavation by steam shovels was confined to the south wall. While this was going on, the widening of the excavated area to elevation −40 was pushed. The steam shovel that excavated the wall culverts worked with a long boom and short jack-arms in order to excavate in a narrow trench to elevation −54 and load on rails laid at elevation −40. The rock walls were preserved in such good shape that it was not necessary to use forms on the back of the main dock walls until they had been built up to a considerable height. The rock also bonded into the wall so well that there is no probability of water entering between the rock and the wall.

As soon as excavation was completed on the south side of the dry dock, the concrete mixing plant was installed. The excavated material was hauled out of the dry dock from elevation −40 as had been originally planned, up the existing incline. This was replaced as soon as possible by a wooden trestle on a 5 per cent grade. The rock along the north wall was removed in a manner similar to the south side with the exception of a very small amount at the east end which was removed by hand. This rock was used in the concrete walls later on. The last steam shovel was taken out of the dry dock in November, 1914. In all there were excavated during the year from the dry dock by hand and by steam shovel 134,777 cubic yards of material. At the final grade, the rock had three well-defined grades of hardness. A great portion of the area, particularly the north side and the east end, is hard blue andesite. At the west end the rock encountered was lighter in color, was not so hard, and was broken up readily. Throughout these two classes of rock were several large seams of varying width, of a very soft and more or less decomposed yellow rock.

After the steam-shovel excavation was completed, the work of preparing the foundations was carried on by hand. The rock was cleaned off, fine particles of earth were cleaned out of the pockets with compressed air, and the whole surface was washed with water and sprinkled with cement. The main walls of the dry dock were reinforced and anchored to the rock on the rear sides by means of old rails which were embedded 6 feet in the rock. These rails were placed in 6-inch drilled holes, the holes being filled with mortar.

General description of construction.—On account of the comparatively small yardage, it was not economical to install any of the electric concrete handling cranes on hand, which had been used at the Pacific locks. It was decided, therefore, to use one-half-yard cube mixers, locomotive cranes with 75-foot booms, and 3-foot gauge locomotives. All of the necessary equipment was available on the Isthmus and was in fairly good condition. The main mixing plant was installed on the south side of the dry dock directly behind the wall. Four one-half-yard cube mixers were placed on the ground. Chutes were extended from the mixers down to hoppers at the floor level. Narrow-gauge engines ran under these hoppers, and 2-yard buckets on flat cars were filled with concrete from the hoppers. The material was transported to locomotive cranes, which placed it in the walls. These four mixers were supplemented later by two similar mixers which were portable, and were placed in various positions where they could discharge directly into forms. The first concrete was placed on August 17, 1914, in the south wall. At elevation −39, the walls were divided into monoliths 60 feet long, alternate monoliths being filled in 4-foot layers. The intervening monoliths were then carried up and at the intersection of the monoliths a diagonal keyway measuring 3 feet on a side was left, forming an open shaft from elevation −39 to the top of the wall in each joint. In opposite corners of the key, 8-inch strips of yellow metal were embedded so that when the vertical shafts are filled with concrete they will make a watertight joint. Due to the large area over which concrete could be placed, it was possible to make the monoliths in 4-foot layers, there being plenty of monoliths ready each day. The 4-foot lifts made it possible for a form to be designed which could be handled without requiring a crane. The forms were made up of panels 4 feet 9 inches wide by 15 feet long, made from seven-eighths-inch material dressed on both sides and supported by 2 by 8 inch cantilever posts, which were fastened to the wall by removable bolts.

The mass concrete consisted of a 1 : 3 : 6 mix, the rock at first being half No. 1 and half No. 2 Ancon rock. Up to December, 1914, Chame sand was used. After that was exhausted, Gamboa sand was authorized and its use was continued until March, 1915, when run-of-bank gravel was authorized. The run-of-bank gravel was inspected at the gravel plant and at the site, and on the whole it proved very satisfactory. There were times when the gravel contained an excess of sand and a little silt. Tests were made to determine the strength of mortars of the different mixtures, and samples of gravel and of rock were sent to Washington and were tested by the Bureau of Standards, with the following result:

Physical tests of aggregates.

Aggregate.	Weight per cubic foot.	Specific gravity.	Per cent of voids.	
			Computed.	Observed.
	Pounds.			
Chame sand	95.0	2.64	44.4	40.6
Chagres sand	102.0	2.72	40.0	38.0
Ancon screenings	80.7	2.56	49.5	50.0
Ancon rock:				
No. 1	82.1	2.50	47.2	....
No. 2	82.1	2.50	47.2	45.0
Chagres gravel:				
Unscreened	130.5	2.78	24.8	21.7
Screened	113.5	2.81	35.4	33.5

Granulometric analysis.

	No. 8.	No. 10.	No. 14.	No. 20.	No. 30.	No. 40.	No. 50.	No. 100.
Aggregate opening in inches	0.097	0.075	0.051	0.034	0.022	0.015	0.011	0.0055
Per cent passing sieves:								
Chame sand	99.9	99.6	99.3	96.18	78.83	59.25	46.08	9.30
Chagres River sand	79.5	71.4	60.0	52.10	35.25	22.75	16.33	4.35
Ancon screening	87.8	70.8	61.3	54.30	44.50	32.90	29.20	18.30

Granulometric analysis—Continued.

	Opening.						
	3-inch.	2-inch.	1½-inch.	1-inch.	¾-inch.	½-inch.	¼-inch.
Per cent passing screens:							
Ancon rock—							
No. 1	96.25	64.00	27.00	2.75	1.00	0	0
No. 2	100.00	100.00	99.00	75.00	59.20	40.50	15.5
Chagres gravel—							
Unscreened	100.00	99.25	91.25	78.50	70.00	56.25	38.5
Screened	100.00	94.75	87.00	65.00	50.75	33.00	12.0

Daily tests were also made to determine the percentage of voids in the run-of-bank gravel and to detect any radical change that would call for a different mixture. Four 75-foot steel booms were ordered early in the year for use on locomotive cranes on hand for handling concrete when the walls had reached an elevation beyond the reach of the standard booms. The Wellman-Seaver-Morgan type of bottom-dump bucket was used and was made to operate automatically by the operator of the crane. The walls were built in this manner to their final height. Reinforced concrete was used mainly around slides, stairways, valves, suction chamber, and around the culvert entrance to the dry dock. The mixture for reinforced concrete was 1 : 2 : 4 when rock was used, and when run-of-bank gravel was used it consisted of four bags of cement to approximately 0.6 yard of gravel. The mixers being placed so that their discharge end was over the chutes leading to the hoppers, it was possible to load up the regular one-half yard machines so as to get 0.65 cubic yard of concrete, place measurement, per batch. When run-of-bank gravel was used, an extra amount of cement was added sufficient to make the mixture equal to that in which Ancon rock was used. There were placed during the fiscal year 128,195 cubic yards of mass concrete, costing $3.97 per cubic yard, and 24,675 cubic yards of reinforced concrete, costing $6.03 per cubic yard.

Excavation in the vicinity of the flooding valves, suction chamber, miter-gate sill, and caisson sill was delayed until December. Due to the seamy nature of the rock about the entrance to the dock, it was considered advisable to form a water cut-off completely across the dock at the caisson sill. This cut-off wall was backed up by a similar cut-off wall behind it at the miter-gate sill. The wall was made by drilling holes in the rock and forcing grout into them under pressure. Two rows of holes 4 feet apart and 6 feet from center to center were drilled across the dock. These holes were drilled 18 feet deep, cleaned out with air and water, and a short piece of 2-inch pipe with one threaded end was grouted into each hole. On the threaded end a 6-inch drum 3 feet long was screwed and filled with thin grout made of equal parts of cement and sand. The grout was forced out of this drum and into the well-cleaned hole by air at a pressure of 80 pounds. The amount of grout that could be forced into each hole could be measured. The average amount was 229 cubic inches per hole.

The floor of the dry dock was to be theoretically 1 foot thick, but due to the different hardness of the rock and also the seams in the floor, particularly under the docking keel and bilge blocks, it was made thicker where necessary. When there was a soft seam a minimum of 4 feet of concrete was placed. On the whole, the dry-dock site was very free from water and very little seepage entered. A few springs were encountered during the work of preparing the foundations for the floor and walls. Where the flow was appreciable it was piped out into the gutters on each side of the floor or into the culverts. Nonreturn valves will be placed on all of these pipes. The water from these springs was analyzed. But one contained a sufficient amount of chlorine to be noticeable to the taste. The least amount of chlorine found was 0.39 parts in 1,000,000. The greatest amount found was 630 parts in 1,000,000.

Vertical surfaces were given no special treatment during placing other than to work the mortar to the face of the forms. All horizontal surfaces, including coping, altars, and floor, were covered to an average depth of from 1½ to 2 inches with mortar composed of cement and specially sifted sand mixed 1 to 2, applied at the same time the concrete was placed. These surfaces were all given a "dapple" finish in the following manner: After applying the mortar and thoroughly rodding it until the water had been worked to the surface and swept off the block with a rodding stick, the surface was thoroughly floated with a wooden float, following which a wooden float was used to produce the rough or dapple surface by placing the float squarely on the surface, pressing it slightly, and lifting it directly upward from the surface. In this way the cement surface adhering to the float is slightly raised so as to give the appearance of chipped stone. The "dapple" finish is sufficiently rough to prevent slipping and makes a very suitable and satisfactory working surface. The floor was laid in blocks in general 12 feet wide by 60 feet long. A very small amount of iron was put in place while the masonry walls were being constructed, but toward the end of the fiscal year many of the gratings and a few valve guides and housings and two-thirds of the crane runway girders were placed. The total amount of fixed iron placed was 312,729 pounds; 2,251,304 pounds of reinforcing rods and rails were embedded in the masonry. The concrete around the granite at the entrance was omitted sufficient to allow the granite blocks to be placed afterwards. This concrete was well provided with anchors, particularly in the sills where it was anchored well into the rock by means of rails. The placing of granite began in May in the miter sill. The granite was delivered cut to final size with the exception of the finished faces of the hollow quoin stones. These stones were laid in the walls with their faces three-eighths inch full. About three-fourths of the hollow quoin stones were in position at the close of the fiscal year. The dressing and finishing of the granite will not begin until all stones are in place. It was decided to erect the miter dock gates from the floor of the dock by means of locomotive cranes with 75-foot booms. To have used the erection bridge that was used for the lock gates would have delayed the erection of the gates until the walls in the vicinity were carried up to their full height. Erection of the steelwork by this division was begun June 12, 1915, and the erection of the girders of both leaves had reached their full height on June 23, 1915. At the end of the fiscal year 565.68 tons of steel had been erected, in which there had been driven 1,919 rivets. The reaming of the individual plates was begun before the erection work started. At the end of the fiscal year 25,000 cubic yards of concrete remained to be placed in the dry dock; 33,787 cubic yards of back fill had been put behind the walls and work started on the foundations of the air compressor and pumping plant. No machinery had been installed. Expenditures to the close of the year amounted to $1,644,155.49, when Dry Dock No. 1 was 61 per per cent completed.

ENTRANCE BASIN.

Excavation.—The shovel work in the entrance basin was carried along with the dry-dock excavation. Very nearly all of the material had been removed at the end of the last fiscal year. The steam pumps which were installed were maintained in operation this year and had no difficulty in handling the water. There was very little seepage through the cofferdam. The remaining excavation for the entrance basin, under and outside of the cofferdam, will be done in the wet after the completion of the dry-dock gates and the installation of the valves, when water can be put behind the cofferdam. The amount of material excavated during the year in the entrance basin by steam shovels was 8,771 cubic yards.

COALING PLANT.

Coal pockets.—There were excavated 17 cubic yards of rock and 4,685 cubic yards of earth in the coal pockets. Riprap retaining walls were constructed around the underwater storage area and around a part of the two dry storage areas; 5,393 cubic yards of concrete were placed in the masonry walls and crane supports. The piers supporting the runways for the berm cranes were erected. The floors of the coal pockets were leveled off with the exception of the south half of the east area.

Coal-handling machinery.—The four berm cranes which were originally used in the Pacific division for handling concrete aggregate were dismantled and brought to the site and erected on the runways provided. The cranes were remodeled to fit the work for which they were to be used. There were erected in these cranes 1,097.80 tons of steel and at the end of the fiscal year they were entirely erected and about half of the machinery had been installed. The unloading towers which were furnished by the Hunt Construction Co. arrived on the Isthmus in May, 1915, and erection work was begun by the United States Steel Products Co. as subcontractors for the erection. At the close of the fiscal year one tower was in place and bolted up but not riveted. No deliveries of the reloading towers and conveyor system had been made at the end of the year by the contractor, Augustus Smith.

Dock No. 7 (unloader wharf).—This dock, 1,052 feet long, supports two coal-unloading towers having a travel of 790 feet, and its back face, together with a wall rising above the floor level, forms the north retaining wall of the coal pocket. The piers supporting the floor of this wharf are founded upon hard rock; the piers are solid monoliths 8 feet wide at the bottom and at the top 6 feet wide, extending the full width of the floor of the dock. The rear face is built on a batter which acts as a support for an apron wall constructed to prevent the coal, when the pockets are full, from running down under the wharf. These piers are well anchored to the rock by means of rails. Most of the piers were constructed to about half their height by spouting the concrete directly from a one-half mixer situated on the original surface behind the walls. After the concrete had reached an elevation too high to proceed with this method a portable elevator tower equipped with a half-yard mixer and revolving chutes was used to deposit the remainder of the concrete. The floor of the wharf is made up of structural steel girders encased in concrete—the steelwork being furnished by the McClintic-Marshall Construction Co. and erected by forces of this division. Efforts were made to contract for the form work on this wharf, but the bids received were not satisfactory. Run-of-bank gravel was used wholly as the aggregate for the concrete, three bags of cement being used in each half-yard batch in the substructure and a one to four and a half mixture being used in the superstructure. At the end of the fiscal year the wharf had been completed to the cofferdam; 18,331 cubic yards of concrete were placed in the unloader wharf.

Dock No. 6 (*reloader wharf*).—The reloader wharf is situated at an angle to and adjoins the unloader wharf. The site was first freed of all obstructions, including old piling, the dredge landing, and a coal chute. This wharf will have a substructure composed of 6-foot cylindrical piers sunk to rock, with the exception of the pier supports under the coal bunkers which will be 8 feet in diameter. The floor will be similar in construction to that of the unloader wharf. In January, 1915, the construction of a trestle was begun and thirteen 6-foot caissons were set in place. The material encountered was mud, loose rock, and a great deal of old French scrap. The underlying rock is very uneven and dips sharply toward the canal. It varies in hardness to a considerable degree. It was difficult to sink the caissons vertically. The reinforcement was designed for the eccentricity and inclination of the cylinders. After the work had started, the bank started a slow movement toward the canal. In order to stop this movement the bank was sluiced down, first by an hydraulic monitor, and later on to better advantage by a monitor installed on the discharge end of a suction dredge. Clay from Diablo Hill, supplemented by mud dumped from scows, was placed on the outside of the wharf face to balance the material. The cofferdam at the north end of the reloader wharf was also widened out. After the movement stopped, the work of caisson sinking proceeded. A large percentage of material was removed from the caissons by orange-peel buckets. At the end of the year all but three of the caissons were in place; 27 had reached rock and 46 were in process of being sunk. All the steel caissons used for this work were made of three-eighths-inch material and on account of the obstructions met in driving them, a few of them buckled at the bottom. These were pulled by the *Hercules*, assisted by derrick barge *No. 156*. Steel sheet piling was driven behind the northeast corner of the wharf in the cofferdam to protect the excavation work at the end of the unloader wharf. A total of 4,246 linear feet of caissons were sunk during the year.

DOCK NO. 9 (ENTRANCE PIER).

The entrance pier is situated on the north side of the entrance basin, and forms an extension of the north wall of the dry dock. The north half of this pier will form the south side of Dry Dock No. 2. The steam-shovel work for the entrance pier was completed in February, when a cut was taken along the south side of the pier to remove the loose rock and to prepare a good foundation for the small supporting piers. The rock under this pier is hard andesite like that in Sosa Hill. It is more or less seamy. Cement grout was forced into drilled holes 18 feet deep and about 4 feet center to center under the dock wall in a manner similar to that used in grouting the holes at the entrance to Dry Dock No. 1. A great deal of care was taken to make the foundations for the gravity wall, which forms the north half of the pier, water-tight. The concrete for the entrance pier was placed by a traveling mixing plant composed of an elevator with movable chutes to discharge directly into the forms. The mixer was fed by hand, and run-of-bank gravel was used as the aggregate throughout the construction of the wall. All of the gravity wall had been completed at the end of the year, with the exception of the openings for the flooding valves. The construction of the supporting piers for the steel decking was well advanced, and about two-thirds of the concrete had been placed. There have been placed 11,232 cubic yards of plain and 602 cubic yards of reinforced concrete during the year. The steel decking was furnished by the McClintic-Marshall Construction Co. None of it has been erected.

COMMERCIAL AND REPAIR WHARVES.

The reinforced concrete wharves referred to in last year's report as quay walls D–E–F, G–H–I, I–J–M–N, and Pier No. 1, have been renumbered, respectively, as follows: Docks Nos. 13 and 14, 15 and 16, 17 and 19, and Pier 18. These wharves were described in the last annual report. During the present year work has continued as follows:

Dock No. 13.—This wharf runs at right angles to Dock 14 and will connect with the masonry walls of the entrance pier and the head wall of Dry Dock No. 2. This wharf is similar to Dock No. 14 and consists of steel floor beams encased in concrete, supporting a reinforced concrete floor slab, all being carried on three rows of 6-foot cylindrical piers founded on rock at an elevation below −45. This wharf is 290 feet long and 61.7 feet wide, and designed for a floor load of 750 pounds per square foot and, in addition, will carry the 50-ton dry dock crane. Great difficulty was encountered in sinking the steel cylinders, due to numerous tracks leading across the site. Thirty-seven caissons out of 39 were sunk to rock at the end of the year. The method of excavating was similar to that for other wharves, except for the use of a derrick barge in place of a locomotive crane. Two-thirds of the steelwork was erected for this wharf at the end of the year, the steel being furnished by the United States Steel Products Co. and erected by this division.

Dock No. 14.—Eight hundred and forty-three linear feet of caissons had been sunk on this dock at the end of last fiscal year, making 23 caissons sunk to rock in which there had been placed 1,487 cubic yards of concrete. Two thousand nine hundred and seventeen linear feet of caissons were sunk during this year to complete the substructure. The steel work for the superstructure was furnished by the United States Steel Products Co. and was erected by this division. The dock was completed, including snubbing posts and brick pavement at the end of the year. Filling behind this dock had been completed for about two-thirds its length. The remaining third can not be filled until after the anchors for Dock 13 are in place. Reinforced concrete anchors were embedded behind the dock and connected directly to the girders of the dock floor by means of 3⅛ inch diameter steel rods tightened by turnbuckles while the rods were heated.

Docks Nos. 15 and 16.—These docks were practically completed last year. The only remaining work performed this year consisted of a small amount of brick paving, driving a few fender piles, and completing the back fill to bring the surface up level with that of the shop yards.

Docks Nos. 17 and 19.—These docks form the head wall to Slips Nos. 1 and 2, and the shore end of Pier No. 18. The substructure and superstructure were completed last year. The brick floor and anchors were placed during this year. At each wharf there will be a small boat landing, consisting of reinforced concrete pontoons and steel landing bridges. An old barge is being used temporarily in Slip No. 1 pending the construction of the reinforced concrete pontoons.

Pier No. 18.—Nearly all of the reinforced concrete superstructure of this 1,000-foot pier was completed last year and little remained to be done, other than placing the brick pavement, the 2½-inch anchor tie-rods, and making the fill which runs through the middle of the pier. When excavation to elevation −45 began along the south face of this pier in Slip No. 1, the pressure of the fill, in the center of the pier on the very soft underlying mud, caused an outward movement of the floor throughout its length before the bank could be sluiced down. Most of this movement took place on the outer half of the pier and reached a maximum of 5½ inches for both sides. Excavation was discontinued in the slip and a portion of the fill in the middle of the pier was removed by steam shovel. The tie-rods were supplemented by a double set of 3⅛-inch diameter steel rods. The outward movement of the pier was stopped before any damage was caused. It is proposed to support the floor in the center of the pier on coral rock fill.

Excavation along Docks Nos. 14, 15, 16, 17, and Pier 18 has been performed by the dredging division. Slip No. 1 was open for commercial use the greater part of the year. Slip No. 2 has been excavated about two-thirds of its length.

Dock No. 2—Fuel-oil crib "C."—In connection with the fuel-oil handling plant, three oil cribs were proposed. The work of constructing the first of these cribs was undertaken by this division. The crib consists of a reinforced concrete dock floor 62 by 62 feet, supported on nine reinforced concrete 6-foot cylindrical piers founded on rock. The steel cylinders for the pier were sunk by the usual method employed on the other docks, with the exception that the derrick barge was substituted for a locomotive crane. Brace piles were driven for the support of the caissons in August, 1914. The caissons were from 70 to 80 feet long and a great deal of difficulty was experienced in sinking and filling these, due to the rise and fall of the tide and to the location in open water. In order to stiffen up the crib, brace piers were put on the rear face of the crib and all of the caissons were tied together by a very heavy system of bracing. Dolphins were placed so that when ships are docked at the crib they will clear the face of the dock by 8 feet. Buoys were put in position toward the end of the year, and all work was completed on the crib and it was turned over to the mechanical division for operation.

Dock No. 1—Quarantine boat landing.—The boat landing for the Balboa quarantine station was designed by this division. This landing is 568 feet long and 10 feet wide, and consists of a reinforced concrete walk over I-beams incased in concrete, supported by reinforced concrete pipe piles. On March 22, 1915, contract was let to Mr. Alex P. Crary for the construction of this landing. At the end of the year all the pipe piles and the shore buttress had been put in place and work had been started on the bracing system and on the forms for the superstructure.

BALBOA SHOPS.

Construction work on the various shop buildings was nearly completed at the end of last year. The main item of work remaining to be done was closing in the sides of the buildings. Changes, added requirements, and necessary delays in construction extended the construction period to June 15, 1915, when the shops were formally turned over to the mechanical division and the storehouse to the supply department, with the exception of a few items of work still remaining uncompleted.

The plaster on metal-lath closures for the buildings was completed in February, 1915. Six thousand and seventy-seven square yards of plaster had been placed. A few changes in the location of machines in buildings Nos. 1, 2, 4, and 8 were made. The last machine footing was poured in January, 1915. Three hundred and seventy-four cubic yards of concrete were placed in machine footings from July, 1914, to January, 1915. Other items of work accomplished during the year were: The erection near the roundhouse of toilet building No. 24, and the construction of the varnish room in building No. 6 in August and September; in October the foundations for the dry kilns in building No. 10 were poured and the steel was erected; in November the closure of the saw-tooth section in building No. 1 was completed; and in December the general foreman's office in the same building was completed. In January the columns of building No. 8 were lined up, and corrugated-iron siding was placed in lieu of plaster on metal lath, and in lieu of the 42-inch concrete wall around the building. General construction work for the installation of the exhaust system in building No. 8 was begun in February. In March the potash-vat building No. 30 was erected and the concrete floor poured. The shops tunnel lateral at Building No. 10 was extended 30 feet into the dry-dock incline during the same month. Miscellaneous work was completed as follows: The installation of metal screening in offices and tool rooms; the installation of two elevators in building No. 5; the erection of the crane extensions at the north ends of both aisles of building No. 1; alterations of framing to accommodate additional steel rolling doors; the shifting of sway bracing in various buildings to allow the installation of the metal louvers; and the realigning and releveling of crane rails in buildings Nos. 1, 2, 3 and 4. Three hundred and seventy-four cubic yards of concrete were placed in machine foundations; 99 cubic yards in building foundations; 61 cubic yards in floors; and 28 cubic yards in walls—a total of 654 cubic yards for the fiscal year, including 92 cubic yards in other small items.

Roofing.—Maintenance of the cement tile roofing was rather expensive during the year on account of the large amount of work done in connection with closures of the buildings and the consequent travel over the tile roofs by workmen, and also on account of the breakage of tile by rocks, due to blasting in the neighboring dry-dock and Sosa Hill excavation. New roofs were laid as follows: Building No. 28 in August, building No. 24 in September, and building No. 30 in April. Materials used on new roofs were: Roofing, 186.80 squares; ridge roll, 506 linear feet; ribbed glass, 83 pieces.

Planing mill exhaust system.—The exhaust system in the planing mill, building No. 8, carries the shavings and sawdust from the machines through vertical risers and overhead piping to a collector over the boiler plant, where they are burned. Erection of the steelwork for the east and west fan houses of the exhaust system was begun in January, 1915. At the end of the fiscal year, erection was complete with the exception of rewiring the motor in the west fan house that had burned out. The 60-day test of the system and the exterior painting remained to be completed.

Steel rolling doors.—Steel rolling doors are used as closures in the ends and sides of the main buildings. Three separate contracts for these doors were made with the James G. Wilson Manufacturing Co. The crane runway doors for the ends of buildings Nos. 1, 2, 4, and 12 constituted the first contract, which was completed in August, 1914. Erection of the doors on the two remaining contracts was completed in September on contract time, and these doors have proved satisfactory in every respect.

Movable metal louvers.—The main buildings have sides and a portion of the ends closed with movable metal louvers. The louver blades are galvanized steel 16 inches wide and one-eighth inch thick. They are arranged in four panels, each about 5 feet wide, to each 21-foot bay. The Mesker Bros. Iron Co. obtained the contract for furnishing approximately 50,000 square feet of louvers for $54,500. Erection began on November 19 and was completed on February 27, 1915. The louvers have proved entirely satisfactory both as to operation and as a protection from the weather. The expenditures on the shop buildings and equipment amounted to $3,264,152 up to the close of the year.

Shop yards.—At the end of the fiscal year practically all of the filling and grading in the shop yards had been completed. The railroad tracks through the yards had nearly all been laid at the end of the year, those omitted being held up on account of interference with other construction work. None of the permanent roads have been built. Some temporary roads were constructed and are in use. Balboa shops were in full operation by the mechanical division during the entire year.

OPERATION OF SOSA HILL QUARRY FOR EAST BREAKWATER.

In order to obtain hard rock for the construction of the east breakwater, it was found to be more economical to excavate rock from Sosa Hill quarry at Balboa than to open up a new quarry. On September 14, 1914, three steam shovels started loading this rock on Lidgerwood cars. The work of this subdivision consisted of mining, loading, and delivering the rock as far as the Balboa terminal yards. The Panama Railroad then hauled the material to Coco Solo yard with Panama Canal transportation crews and equipment. On October 8, 1914, the shovels were put on a 12-hour basis and deliveries to Coco Solo were made on a 12-hour basis also. Owing to the proximity of the shop buildings, it was impossible to blast the rock as economically as it would have been otherwise. Large rock containing 2 cubic yards or more was loaded separately for use as "armor" rock. The cost of all labor and materials up to the end of January, 1915, necessary to put this rock on cars and deliver it as far as the terminal yards, including all overhead expenses, was $0.574 per cubic yard. On February 9, 1915, the operation of the quarry for the east breakwater was discontinued, due to a severe norther which partially destroyed the breakwater trestle. Excavation was not resumed for the breakwater during the year.

ANCON QUARRY.

The operation of Ancon quarry, under the immediate supervision of Mr. James Dougherty, continued to November 1, 1914. Only one steam shovel was in use. Rock classified as No. 1 and No. 2 and screenings were produced daily. A total of 120,245 cubic yards of No. 1 rock and 70,663 cubic yards of No. 2 rock was produced. Table 17 shows the work performed during the year. At the end of October the crushers were shut down, but the equipment was allowed to remain in place on the hill until later in the year. In February and March, 1915, the crushers were removed and by May 1 all rail and small equipment were removed from the quarry.

SAND SERVICE.

At the beginning of the fiscal year sand was being unloaded by this subdivision at Miraflores Locks by a locomotive crane working on a double shift. At the end of July one more crane was added and the work was put on a 12-hour basis. This produced enough sand to allow some to be placed in storage. In September the unloading of sand was transferred to Balboa at Dock 16. On October 24 the Chame sand service was discontinued and the requirements of the different divisions were supplied from the storage pile at Miraflores, it being loaded by steam shovel. The crew on this shovel also operated the shovel at the rock storage pile at Balboa when stone was required for concrete work. The handling of sand was later on taken over by the supply department.

RECLAMATION OF LAND.

The work performed by this division in connection with the reclamation of land has been confined almost entirely to the construction of a dike on the north side of the north leg of Balboa "Wye." There was some work, mainly maintenance, in addition to this on the earth dikes. In February, 1915, all work in connection with the reclamation of land was transferred to the dredging division.

NAOS ISLAND BREAKWATER.

Naos Island Breakwater was nearing completion at the end of last fiscal year. In July, 1914, levels taken indicated that the settlement was very small and confined to a comparatively short length, immediately north of Naos Island. Mr. W. B. Casey, general foreman, in immediate charge of the work, was transferred to the Atlantic terminals on September 15, 1914, when the breakwater was practically completed. A little work was performed afterwards by this division, including the removal of old rail and other material from the site. A total of 24,536 cubic yards of material was placed in the breakwater during the year, making a total of 2,141,536 cubic yards.

STEEL ERECTION.

A small organization has been maintained during the year for the erection of the structural steel for work performed by this division. This organization has also been at the disposal of other divisions on similar work. This work was under the immediate supervision of Superintendent J. W. Wright. The work performed during the year is as follows: Completion of the dismantling of the berm cranes at Miraflores and the erection of four of these cranes at the Balboa coaling plant; erecting the steel deck of Docks 7, 13, and 14; dismantling at different points on the Isthmus 9 oil tanks and reerecting them; erecting 5 gangway bridges; erecting the frame of building No. 30, Balboa shops; making numerous minor structural changes in Balboa shop buildings; taking down Gatun water tank for the municipal division. On June 12, 1915, the erection of the dock gates began and at the end of the year 565.68 tons of steel had been erected, consisting mainly of girders and frames.

GENERAL.

The average number of men on the rolls during the fiscal year was 2,044. The office performed all of the routine and special work made necessary to handle the construction force on the above items of work. There were employed 13 gold and 18 silver men for carrying on this work—some of the gold men acting also as engineering inspectors. Junior Engineer E. W. Baldwin was in immediate charge of all survey work connected with Pacific terminals. Mr. A. L. Prather acted as chief inspector on the shops and coaling plant work and on the erection of the steelwork for the wharves.

TABLE 1.—*Material excavated, Pacific terminals, July 1, 1914, to June 30, 1915.*

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Dry Dock No. 1	43,580	18,974	14,979	21,070	4,393	3,783	5,786	5,790	4,849	4,920	3,224	3,429	134,777
Entrance basin	1,737	840				3,912	2,282						8,771
Entrance pier					290	655	1,328	2,760	94			186	5,313
Unloader wharf	74	1,170		100	42	162	3,776	80			3,868	2,133	11,405
Coal pocket	879	2,789	17	60	237	260	250	210					4,702
Reloader wharf:													
Caissons—By orange-peel						105	135	457	822	581	832	682	3,614
By hand								87	237	69	445	523	1,361
Anchors										2,376		300	2,676
Quay wall D-E-F:													
Caissons—By orange-peel	107	72				2		2					183
By hand	156	289	537	408	288	361	235	38	167	207		218	2,904
Anchors								449	371	50			870
Pier No. 1, J-K-L-M, anchors	50							360	4,823				5,233
Balboa shops:													
Preparing site												268	268
Shop foundations		30							22	15	8	92	167
Shop floors	11							27	19		2		59
Shop beams, etc										70	4		74
Machine foundation	7	65	425	298	119	50			9			47	1,020
Shop tunnel									14				14
Drains and ducts	140		20	145		38						188	531
Miscellaneous						7				4			11
Preparing site:													
Sosa Hill		42,943											42,943
Diablo Hill s. s											4,800		4,800
Sosa Hill, for east breakwater			53,557	85,508	92,690	79,598	82,542	38,834	9,430	36,006	16,728	22,324	517,217
Oil Crib No. 1				24	169	76	60						329
Reclaiming land, dikes	72	464	78	112									726
Miscellaneous		154		33								3,324	3,511
Grand total	47,155	67,790	69,613	107,758	98,228	89,009	96,394	49,094	20,857	44,298	29,911	33,714	753,821

TABLE 2.—*Filling and embankment work, Pacific terminals, July 1, 1914, to June 30, 1915.*

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Shop fill:													
Preparing shop site—													
Earth and rock	1,935	6,549	559	1,180	513	174	3,306	1,094	7,687	15,881	4,593	220	43,691
No. 1 rock				81	30	55	155						321
No. 2 rock					142	83							225
Screenings		30			121		91						242
Cinders							15						15
Gravel				45		45	98	587					775
Miscellaneous—													
Earth and rock			16	3			140					16	175
No. 1 rock	140			138		46							324
No. 2 rock						23							23
Cinders										15			15
Gravel				15		75	75	50	114	15			344
Tracks—													
Earth and rock						91							91
No. 1 rock	1,570	875	150		20								2,615
No. 2 rock	600	1,025	50										1,675
Screenings		287											287
Cinders										69			69
Gravel	725							838		285	820	263	2,931
Total	4,970	8,766	775	1,462	826	592	3,880	2,569	7,801	16,265	5,413	499	53,818
Back fill:													
Dry Dock No. 1:													
Incline D-D					846	462	711	39	14		304		2,376
Incline E-B		3,456	2,914										6,370
Walls							1,112	5,729	2,394	4,076	2,195	9,535	25,041
Coal pocket—													
Walls, floor, etc	1,064	1,922	15				1,400	338	215			600	5,554
Berm crane		171		38		60							269
Incline and general	7,434	22,519	12,417	4,490	1,203	6,801							54,864
Unloader wharf, back fill		741	370	309	682	5,912	323	110	2,253			196	10,896
Anchorage—													
Quay wall D-E-F								102	678	20			800
Lumber wharf F-G	548												548
Preparing site:													
Dock fill D-E-F, earth and rock					288	363				8,104		10,006	18,761
Dock fill—													
Earth and rock	6,836	12,052	6,494	1,889	1,044		342	2,267	1,646	312		40	32,922
No. 1 rock				15	180	460	560						1,215

TABLE 2.—*Filling and embankment work, Pacific terminals, July 1, 1914, to June 30, 1915*—Continued.

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Preparing site—Continued.													
Dock fill—Continued.													
Bulkhead wall to Panama R. R. yard—													
Screenings				46									46
Gravel							705	558	140	23		45	1,471
Yard fill, Panama R. R. to Diablo—													
Earth and rock	114	4,700	874		146			1,110	2,940	560	1,604	784	12,832
No. 1 rock	1,470		423			20							1,913
No. 2 rock			1,025										1,025
Screenings									77				77
Cinders									303	60			363
Gravel	135					83	300		1,406	648			2,572
Center fill—													
Pier No. 1, rock		7,820											7,820
Bulkhead, rock		580											580
Miscellaneous and plant fill:													
Cofferdam									292	1,816	3,911	1,582	7,601
Dikes, Curundu	72	464	78	112									726
Miscellaneous, earth and rock								70		120	165	225	580
Preliminary and general tracks—													
Rock	300	65		205	80	100	60						810
Cinders												23	23
Sosa quarry, dock, etc.—													
Screenings	61	30		15									106
Gravel						76				60	60	167	363
Sand			175	23									198
Fill to other divisions—													
Naos Island Breakwater and tracks—													
Earth and rock	19,980	720	704		1,400						224	1,308	24,336
No. 1 rock				200									200
Fortifications—													
Earth and rock		112				590	14,246	5,142	574	178	2,971	3,818	27,631
No. 1 rock			200										200
Balboa townsite and quartermaster storehouse—													
Earth and rock		2,952	12,558	9,128	1,702	9,248	98						35,686
No. 1 rock			50	50	40	15							155
Screenings					46								46
Permanent quarters—													
Earth and rock			544										544
No. 1 rock			238										238

Panama R. R.—													
Miraflores Tunnel	578		1,004	200									1,782
Various stations	292	1,176	784			238	4,634	304				240	7,668
Colon Mole	2,678							5,472		12,136	12,752		33,038
Piers 9 and 10, rock		96											96
Miscellaneous—													
Cristobal coal plant					236								236
Miraflores Locks			56										56
Electrical division				112									112
Oil facilities												80	80
Sanitary dumps							2,178						2,178
Waste and dumps	5,361	1,280	72				1,534					1,440	9,687
Hospicio de Huerfanos, Panama												16	16
East breakwater—													
Armor rock						991	5,292	3,792	448				10,523
Rock fill			28,080	88,780	89,188	62,621	58,980	22,368				1,984	352,001
Rock, tracks			1,134										1,134
Grand total	51,893	69,622	70,984	107,074	97,907	88,632	96,355	49,970	21,181	44,378	29,599	32,588	760,183

TABLE 3.—*Summary of concrete work done, Pacific terminals, July 1, 1914, to June 30, 1915.*

Item.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Shop building	19	58	52	189	52	33	92		50	35	56	18	654
Shop tunnel	3								41				44
Dry dock		3,156	16,233	18,084	10,027	15,250	18,638	14,335	20,021	17,713	11,825	7,588	152,870
Entrance pier						3,453	2,924	608	2,819	614	402	1,014	11,834
Unloader wharf		1,644	1,907	3,083	1,612	1,011	1,439	2,385	1,947	1,707	1,416	180	18,331
Coal pocket	1,604	423	114	350	325	373	210		133	676	646	539	5,393
Reloader wharf									140	60			200
Dock D-E-F		363	1,814	1,450	2,040	1,237	1,428	581	635	476	12	429	10,465
Lumber wharf F-G	45												45
Bulkhead 1-J-M-N	768	19	2										789
Pier No. 1 J-K-L-M	3,715	258	7							21	17		4,018
Oil facilities	Pumping plant	82			Crib No. 1.	255	311	254	201	179			1,282
Miscellaneous	D.D. trestle.	49	D.D. mixers.	2							D. D. gates. East breakwater.	76 25	152
Grand total	6,154	6,052	20,129	23,158	14,056	21,612	25,042	18,163	25,987	21,481	14,374	9,869	206,077

TABLE 4.—*Distribution of concrete placed, Pacific terminals, July 1, 1914, to June 30, 1915.*

Item.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Shops:													
Buildings—													
Foundation piers		20							28		33	18	99
Machine footings	6	7	30	186	52	20	73						374
Beams and girders										29	7		36
Floors	13	2	19				1		19	5	2		61
Walls		3					14				11		28
Roofs											3		3
Miscellaneous		26	3	3		13	4		3	1			53
Tunnel—													
Plain									6				6
Reinforced	3								35				38
Docks:													
Quay wall F-G, anchorages	45												45
Bulkhead I-J-M-N—													
Caisson filler	81												81
Floor system	581	5	2										588
Floor cinder	70												70
Balustrade, seats, etc	12	14											26
Anchorages	24												24
Pier No. 1—													
Caisson filler	241												241
Floor system	3,291	80	7										3,378
Floor cinder	122	160											282
Anchorages	61	18								21	17		117
Dry dock No. 1:													
Mass		3,156	16,221	18,063	9,623	12,569	14,496	9,526	18,513	13,552	7,693	4,783	128,195
Reinforced			12	21	404	2,681	4,142	4,809	1,508	4,161	4,132	2,805	24,675
Entrance pier:													
Walls—													
Plain						3,453	2,890	588	2,682	576			10,189
Reinforced							34	20	137	38			229
Piers—													
Mass											375	668	1,043
Reinforced											27	346	373
Coaling plant:													
Unloader wharf—													
Plain buttresses		1,644	1,907	3,083	1,612	1,011	1,361	2,268	1,737	26	24		14,673
Floor system								117	210	1,226	774		2,327
Curtain walls and aprons							78			455	618	180	1,331
Reloader wharf, caisson filler									140	60			200
Coal pocket—													
Plain—													
Walls	1,090	423	114	268		228	77		46	82	44	41	2,413
Viaduct foundations	33				43	18							94

Reinforced—													
Walls										85			85
Viaduct walls and posts									7		66	498	571
Berm cranes—													
Plain track—													
Foundation	98			82		32							212
Piers	383				282	95	133						893
Reinforced girders and track									80	509	536		1,125
Docks:													
Quay wall D-E-F—													
Caisson filler		333	1,771	1,373	677	519	715	509	147	450		394	6,888
Floor system					1,352	661	686		437				3,136
Anchorages		30	43	77	11	57	27	72	51	26	12	35	441
Oil facilities:													
Crib No. 1—													
Caisson filler						255	311	181	33	28			808
Floor system									99	146			245
Bracing								73	51				124
Anchors									18	5			23
Oil-handling plant, boiler and stack		82											82
Miscellaneous and plant		49		2								101	152
Grand total	6,154	6,052	20,129	23,158	14,056	21,612	25,042	18,163	25,987	21,481	14,374	9,869	206,077
Coal pocket, rubble walls	28	16	16		130	494	492	1,261				362	2,799

TABLE 5.—*Tracks laid and removed, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Laid.	Removed.	Month.	Laid.	Removed.
1914.	*Lin. ft.*	*Lin. ft.*	1915.	*Lin. ft.*	*Lin. ft.*
July	10,687	8,566	January	6,958	2,438
August	10,584	7,672	February	6,514	4,717
September	24,211	9,547	March	6,682	4,405
October	9,769	11,994	April	7,733	3,246
November	7,797	12,780	May	5,680	3,383
December	6,550	8,620	June	4,601	4,656
			Total	107,766	82,024

TABLE 6.—*Drilling, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Linear feet.	Month.	Linear feet.
1914.		1915.	
July	33,082	January	36,165
August	19,000	February	12,627
September	15,152	March	9,040
October	42,902	April	15,887
November	38,722	May	15,797
December	12,109	June	19,195
		Total	269,678

TABLE 7.—*Explosives used, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Pounds.	Month.	Pounds.
1914.		1915.	
July	31,625	January	38,000
August	16,940	February	14,750
September	24,600	March	2,925
October	48,150	April	9,995
November	46,350	May	8,948
December	44,940	June	10,797
		Total	298,020

TABLE 8.—*Piles driven, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Linear feet.	Month.	Linear feet.
1914.		1915.	
July	5,646	January	16,657
August	11,816	February	4,220
September	145	March	17,414
October	....	April	11,251
November	583	May	24,039
December	8,507	June	12,129
		Total	112,407

TABLE 9.—*Steam-shovel excavation, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Earth.	Rock.	Total.	Month.	Earth.	Rock.	Total.
1914.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	1915.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
July	....	44,741	44,741	January	483	87,792	88,275
August	22,019	42,945	64,964	February	....	40,954	40,954
September	15,793	50,705	66,498	March	4,974	8,706	13,680
October	2,152	99,203	101,355	April	2,768	35,614	38,382
November	....	92,978	92,978	May	12,094	13,302	25,396
December	....	83,510	83,510	June	7,250	19,828	27,078
				Total	67,533	620,278	687,811

TABLE 10.—*Performance of steam shovels, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Average number of shovels working.	Hours under steam.	Hours working.	Excavation.			Average per hour under steam.	Rainfall.
				Earth.	Rock.	Total.		
				Cu. yds.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Inches.*
1914.								
July	3.44	1,108	438.75	....	44,741	44,741	40.38	5.00
August	3.03	704	279.58	22,019	42,945	64,964	92.28	5.19
September	2.68	816	410.23	15,793	51,645	67,438	82.64	7.72
October	4.15	1,264	709.58	2,152	99,203	101,355	80.19	6.97
November	4.04	1,100	590.67	....	92,978	92,978	84.53	11.99
December	4.19	1,141	598.42	....	83,510	83,510	73.19	7.41
1915.								
January	6.00	1,524	765.73	403	87,792	88,275	57.92	2.23
February	2.65	617	335.83	....	40,954	40,954	66.38	2.73
March	1.48	320	170.83	4,974	8,706	13,680	42.75	....
April	3.23	668	351.33	2,768	35,614	38,382	57.46	4.37
May	2.65	552	307.25	12,094	13,302	25,396	46.01	7.92
June	2.65	544	371.91	7,250	19,828	27,078	49.77	2.37
Grand (total) average	3.35	10,358	5,350.11	67,533	6,212.18	6,887.51	66.68	63.90

TABLE 11.—*Reinforcing and fixed steel used, Pacific terminals, July 1, 1914, to June 30, 1915.*

Months.	Reinforcing steel.	Fixed steel.	Total.
	Pounds.	*Pounds.*	*Pounds.*
1914.			
July	749,434	269,524	1,018,958
August	308,693	120,173	428,866
September	412,564	11,804	424,368
October	416,620	55,638	472,258
November	407,155	27,951	435,106
December	604,339	30,922	635,261
1915.			
January	530,548	35,580	566,128
February	259,597	41,459	301,056
March	430,347	179,112	609,459
April	652,363	231,537	883,900
May	454,649	104,929	559,578
June	305,265	160,678	465,943
Total	5,531,574	1,269,307	6,800,881

TABLE 12.—*Fixed steel used, Pacific terminals, July 1, 1914, to June 30, 1915.*

Item.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Shops, buildings	32	564	21	1,525	733	300	723	52	163				4,113
Dry dock		552	2,024		528	2,640	18,867	18,118	22,960	83,420	62,788	100,832	312,729
Entrance pier												1,280	1,280
Unloader wharf					2,640			6,822	53,806	109,245		1,348	173,861
Coal pocket	76,038							1,910	51,146			588	129,682
Dock D-E-F		4,325	8,859	54,113	24,050	27,982	15,990	14,557	35,911	7,654	18,969	16,079	228,489
Lumber wharf F-G	14,710		450										15,160
Quay wall G-H-I			450										450
Bulkhead I-J-M-N	16,870												16,870
Pier No. 1, I-J-M-N	161,874	114,732							15,126	31,218	23,172	40,551	386,673
Grand total	269,524	120,173	11,804	55,638	27,951	30,922	35,580	41,459	179,112	231,537	104,929	160,678	1,269,307

TABLE 13.—*Reinforcing steel used, Pacific terminals, July 1, 1914, to June 30, 1915.*

Item.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Shop buildings	38	1,398	1,989	17,710	1,042		3,954		7,260	7,055	4,356	1,362	46,164
Shop tunnel									3,264				3,264
Dry dock		131,310	146,701	83,178	212,310	311,855	256,198	123,640	245,161	310,412	289,054	141,485	2,251,304
Entrance pier				40,950	2,100	25,713	36,952	15,937	19,944	59,220	35,257	42,700	278,773
Unloader wharf		103,380	54,297	50,983	8,517	39,037	36,151	48,319	5,979	111,772	105,948	333	564,716
Coal pocket	27,729	3,850	1,703		38,573	6,130	11,038		2,220	39,035	16,534	44,218	191,030
Reloader wharf									78,312	31,417		21,442	131,171
Dock D-E-F		68,755	207,874	223,742	144,613	149,644	80,808	56,601	47,097	79,062	3,500	53,725	1,115,421
Lumber wharf F-G													
Quay wall G-H-I													
Bulkhead I-J-M-N	70,942												70,942
Pier No. 1 J-K-L-M	650,725												650,725
Caissons													
Oil facilities, oil berth No. 1						71,960	105,447	15,100	21,110	14,390			228,007
Curundu culvert													
Paraiso Bridge													
Miscellaneous				57									57
Grand total	749,434	308,693	412,564	416,620	407,155	604,339	530,548	259,597	430,347	652,363	454,649	305,265	5,531,574

TABLE 14.—*Structural steel used, Pacific terminals, July 1, 1914, to June 30, 1915.*

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Shops:													
Building No. 24	....	10.78	....	....	....	....	....	....	....	....	....	....	10.78
Building No. 1	....	....	....	....	....	....	....	68.33	....	....	....	....	68.33
Building No. 30	....	....	....	....	....	....	....	....	10.31	....	....	....	10.31
Dry-dock crane girders	....	....	....	....	....	....	....	....	....	....	....	91.43	91.43
Unloader wharf	....	....	....	....	....	....	....	206.54	....	324.03	....	....	530.57
Unloader tower	....	....	....	....	....	....	....	....	....	....	....	150.00	150.00
Berm cranes	....	....	....	112.50	233.75	129.90	423.50	70.15	118.00	10.00	....	....	1,097.80
Berm crane track girders	....	....	....	....	....	....	....	243.59	....	....	....	....	243.59
Quay wall D-E-F (deck)	....	....	....	503.38	260.70	260.70	....	119.27	....	....	172.32	....	1,316.37
Bulkhead wall I-J-M-N—Landing bridge	....	....	....	....	....	....	25.00	25.00	....	....	....	....	50.00
Quarantine landing bridge	....	....	....	....	....	....	....	....	....	12.50	....	....	12.50
Dry-dock gates	....	....	....	....	....	....	....	....	....	....	....	565.68	565.68
Grand total	....	10.78	....	615.88	494.45	390.60	448.50	732.88	128.31	346.53	172.32	807.11	4,147.36

TABLE 15.—*Caisson operations, Pacific terminals, July 1, 1914, to June 30, 1915.*

	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Penetration (linear feet):													
Quay wall D-E-F	251	345	545	388	245	335	224	35	155	197	....	208	2,928
Unloader wharf	....	....	....	....	....	....	....	....	....	....	....	52	52
Reloader wharf	....	....	....	....	....	102	129	520	792	485	1,087	1,131	4,246
Oil crib	....	....	....	23	113	68	54	....	....	....	....	....	258
Total	251	345	545	411	358	505	407	555	947	682	1,087	1,391	7,484
Number of caissons sunk into rock:													
Quay wall D-E-F	7	6	20	14	19	13	2	4	2	6	....	5	98
Reloader wharf	....	....	....	....	....	....	....	....	6	9	6	6	27
Oil crib	....	....	....	....	4	2	3	....	2	....	....	....	11
Total	7	6	20	14	23	15	5	4	10	15	6	11	136
Concrete in filler (cubic yards):													
Bulkhead I-J-M-N	81	....	....	....	....	....	....	....	....	....	....	....	81
Pier No. 1	241	....	....	....	....	....	....	....	....	....	....	....	241
Quay wall D-E-F	....	333	1,771	1,373	677	519	715	509	147	450	....	394	6,888
Reloader wharf	....	....	....	....	....	....	....	....	140	60	....	....	200
Oil crib	....	....	....	....	....	255	311	181	33	28	....	....	808
Grand total	322	333	1,771	1,373	677	774	1,026	690	320	538	....	394	8,218

TABLE 16.—*Trestle built, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Linear feet.	Month.	Linear feet.
1914.		1915.	
July	86	January	315
August	565	February	52
September		March	263
October		April	653
November		May	954
December	160	June	220
		Total	3,268

TABLE 17.—*Work done at Ancon quarry, Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Crushed rock.		Screenings.	Drilling.	Explosives.
	No. 1.	No. 2.			
1914.			*Cu. yds.*	*Lin. ft.*	*Pounds.*
July	20,225	20,908	4,946	4,330	10,000
August	28,806	22,566	4,693	5,070	19,000
September	32,471	11,790	3,581	5,170	10,000
October	38,743	15,399	2,496	4,065	8,750
November (quarry closed)					
Total	120,245	70,663	15,716	18,635	47,750

TABLE 18.—*Material placed (Naos Breakwater), Pacific terminals, July 1, 1914, to June 30, 1915.*

Month.	Cubic yards.	Month.	Cubic yards.
1914.		1915.	
July	19,980	April	
August	720	May (tracks)	224
September	704	June (tracks)	1,308
October (No. 1 rock for ballast)	200	Total	24,536
November	1,400		
December		Dumped to June 30, 1914	2,117,000
1915.		Dumped from July 1, 1914, to June 30, 1915	24,536
January			
February			
March		Total to date	2,141,536

ATLANTIC TERMINALS.

CRISTOBAL COALING PLANT.

During the year Superintendent W. G. Thompson has continued in immediate charge of this work, including all construction, field engineering, and the inspection of contract work. Junior Engineer R. A. Wilson has continued in charge of field engineering. Junior Engineer E. C. Smith, jr., has been inspector of steelwork since January 1, 1915, and Assistant Engineer Bernard Duchscher has been mechanical inspector since May 12, 1915.

General.—During the year the dredging division completed the excavation of the subaqueous coal pocket to elevation −28.0. The coral sand and rock was pumped ashore and used as backfill. The total material dredged for the coaling station was 188,667 cubic yards.

Some additional dredging was done in the slip west of reloader wharf and in the channel north of the plant.

Two lines of trestle were driven for placing caisson foundations under the reloader wharf; one line was driven on the unloader wharf; and guide piles in rows and capped with heavy timbers were driven for the end-wharf caissons. Caisson foundations for the south 500 feet of unloader wharf were completed on January 1, 1915. This portion of the work was given preference to permit the early erection of the unloader towers. Caisson foundations for the entire unloader wharf were completed on June 4, 1915, and for the entire reloader wharf on June 15. Work on caissons for the end wharf commenced on June 5, 1915, and on June 30, 8 out of 31 caissons had been completed. These caissons are all 6-foot cylinders of one-half or three-eighths inch steel plate, and riveted in lengths of from 10 to 50 feet, depending on the depth of water. They were set in position and driven to hard rock with a heavy steam hammer, through from 40 to 80 feet of coral rock, sand, and clay, and after being excavated and reinforced with steel rails, were filled with concrete.

The steel deck was erected by contract. At the end of the year the deck steel for the unloader wharf had been erected and riveted, and that for the reloader wharf had been 98 per cent completed. No deck steel had been erected for the end wharf. Total weight of the deck steel is 5,487 tons. The south 520 feet of the reinforced-concrete floor of both unloader and reloader wharves was completed at the end of the year; thus 1,040 linear feet of wharf structure was entirely completed, except for the installation of the wooden fender system and the cast-iron snubbing posts. The concrete retaining walls south of the coaling pier which carry the stocking and reclaiming bridges were completed except for concreting in the permanent tracks. The foundations for the transformer house and for the viaduct trestle south of the wharves were completed. Ninety per cent of all permanent railroad tracks south of the wharves are in their permanent position, and require only a small amount of ballasting. An embankment, having its center approximately on the center line of the wharf and its top at elevation −4.0, is being made under each wharf by pumping in coral rock with a suction dredge working in the reloader slip. On top of this fill hard rock from Sosa Hill is being dumped to elevation +2.0, so as to cut off the sea from the coal pile. By this embankment the coal will be effectually retained and protected. The east shore of the coaling station south of the unloader wharf was riprapped with hard rock from Sosa Hill. All fill necessary to complete the coaling plant south of the wharves was completed during the year.

Stocking and reclaimimg bridges, reloader towers, viaduct, etc. (W. O. 40483).—The erection of the two 315-foot stocking and reclaiming bridges which span the coal-storage area was commenced by the subcontractor in November, 1914. At the end of the fiscal year both bridges had been completed, except for the installation of the propelling machinery. All viaduct trestle south of the wharves and 500 feet of trestle on south end of the reloader wharf were completed, except for the installation of crossties and rails. The transformer house was about 75 per cent completed.

Foundations for the track scales were completed by The Panama Canal. Some structural material for the four reloader towers arrived during June, but owing to the nonarrival of the trucks the erection was not started. The above is part of the Augustus Smith contract. The United States Steel Products Co. is the subcontractor for the structural steel.

Unloader towers (*W. O. 40587*).—The erection of structural steel for these four towers, being furnished by the Hunt Construction Co., at the south end of the unloader wharf, commenced on March 3, 1915, and progressed satisfactorily to the end of the year. Efforts are being concentrated on the two north towers, so that they may be ready for operation during September, 1915, if possible. This will also permit the partial use of the plant by unloading coal and storing it behind the unloader wharf within the area reached by the inshore end of unloader tower booms and covered by the travel of the towers along the wharf.

A proposed modification of the unloader towers will enable them to reload coal into vessels and barges alongside unloader wharf by chute, as well as by bucket. This is expected to assist in relieving the existing rather inadequate unloading and reloading facilities. These accessory chutes will be useful to the permanent plant. The two north towers were completely erected and riveted, and in tower No. 1 85 per cent of the machinery had been installed, while in tower No. 2 about 40 per cent of the machinery had been installed on June 30. Of the two south towers No. 3 was completely erected and 85 per cent riveted, while tower No. 4 was completely erected and partly riveted on June 30.

Construction trestle.—Much of the timber trestle originally contemplated for setting of steel caissons was dispensed with by using a derrick barge. By this means about 1,300 linear feet of trestle were saved.

Caisson work.—Caisson driving started in July, 1914, and excavation began soon afterwards. All excavation possible was done with orange-peel buckets on locomotive cranes. When material near the bottom became too hard to handle in this way, hand excavation was resorted to. For a time the handwork was carried on by colored laborers by day labor. In October, 1914, the "task" system was introduced. This resulted in an increased output at a decreased cost. The men were paid $1 per yard for soft rock and $2 per yard for hard rock. The material consisted of 3 or 4 feet of mud at top, then from 40 to 80 feet of coral, which was in alternating layers of coral sand and finger coral, several feet in thickness, and layers of solid coral rock 5 or 6 feet thick. Underlying the coral was a bed of stiff clay, then a soft yellow rock, under which was the argillaceous sandstone in which the bottoms of cylinders rest.

When it was impossible to drive a cylinder to rock on account of friction or an obstruction, it was excavated to the bottom, and in order to cut off the water and soft mud, a section of slightly smaller diameter cylinder was lowered inside and driven by lowering the steam hammer down to the bottom. In every case the smaller section was successfully driven to hard rock, after which the excavation was completed. In the deep-water section, "recoverable" cylinders, bolted in sections, were used, and in most cases were recovered from the mud line up and thus used many times. These sections were unbolted below water by colored divers working in small diving bells. This method was found to be very successful and economical.

From October, 1914, the riveting of caissons was carried on by the "task" method, a gang of seven men being paid $3.13 per completed section. This amounted to 5½ cents per rivet driven, including bolting, riveting, and calking. The depths to rock foundation ranged from elevation −38 at south end of unloader wharf to elevation −110 at north end of unloader wharf. In all 11,917 linear feet of penetration were made, 15,027 cubic yards of material were excavated, and 17,953 cubic yards of concrete filler were placed in caissons during the year.

Concrete.—Most of the caissons were sealed at the bottom while full of water. After this the water was pumped out, the top surface of the concrete was cleaned, and the filling of the cylinder proceeded as in an open form above ground. This method assured a good quality of concrete. Run-of-bank gravel was used with a 1:5 mixture for the cylinders, and 1:4 mixture for the floor. A floating concrete plant was rigged for filling caissons and for the wharf floor, and an elevator tower was also rigged on a flat car ashore for this work. 17,953 cubic yards were placed in caissons, 6,577 cubic yards were placed in wharf floors, 3,873 cubic yards in bridge track retaining walls, and 316 cubic yards in miscellaneous foundations, etc., during the year.

Deck steel, wharves.—The steel for the wharf floor was furnished by the United States Steel Products Co. It was erected by contract by Mr. J. O. Childers, who commenced erection in February.

Miscellaneous.—During July and August, 1914, forces of this subdivision constructed the foundations for the beacon at the sea end of Toro Point Breakwater in Limon Bay for the lighthouse subdivision. Small repairs to the concrete lining of Cristobal Dry Dock were also made during the year. The maximum number of men employed during the year was, Cristobal coaling station 667, contractors 243, total 910. On June 30, 1915, the Panama Canal force included 48 gold employees and 456 silver employees.

Tabulated reports of work accomplished and material used follow:

CONCRETE.

	Bridge supports.	Caissons.	Floor.	Miscellaneous.	Total.
1914.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
July	2,739				2,739
August	702			14	716
September	93	406			499
October	197	1,479		14	1,690
November	2	1,123			1,125
December	50	2,420			2,470
1915.					
January	17	2,297		102	2,416
February	41	309		86	436
March		1,901	1,140		3,041
April		2,781	1,989	10	4,780
May	20	2,916	2,360	85	5,381
June	12	2,321	1,088	5	3,426
Total	3,873	17,953	6,577	316	28,719

TRACKS.

	Temporary track.		Permanent track laid.	Total.
	Laid.	Removed.		
1914.	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*
July	890	650	....	1,540
August	1,150	1,075	....	2,225
September	3,926	1,050	....	4,976
October	2,678	300	....	2,978
November	3,926	1,050	....	4,976
December	250	....	....	250
1915.				
January	200	300	540	1,040
February	1,500	1,000	....	2,500
March	1,000	1,000	1,680	3,680
April	200	900	2,352	3,452
May	1,200	600	1,937	3,737
June	1,500	2,000	1,200	4,700
Total	18,420	9,925	7,709	36,054

PILES DRIVEN.

	Bridge supports.		Construction trestles—wood.	Miscellaneous—wood, concrete, and pine.	Total.
	Wood.	Pipe.			
1914.	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*	*Lin. ft.*
July	2,555	556	11,445	1,283	15,839
August	1,395	1,239	6,249	2,217	11,100
September	....	170	960	....	1,130
October	....	1,753	5,280	2,945	9,978
November	....	....	5,360	....	5,360
December	2,565	....	12,323	....	14,888
1915.					
January	....	220	7,740	....	7,960
February	....	....	8,600	....	8,600
Total	6,515	3,938	57,957	6,445	74,855

REINFORCING IRON.

	Bridge supports.	Caissons.	Floor.	Miscellaneous.	Total.
1914.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
July	52,034	....	....	....	52,034
August	30,633	....	....	....	30,633
September	3,162	71,150	....	....	74,312
October	....	257,332	....	186	257,518
November	1,175	273,499	....	....	274,674
December	8,348	472,699	....	....	481,047
1915.					
January	13,502	492,931	....	....	506,433
February	....	87,397	....	....	87,397
March	....	454,389	30,186	....	484,575
April	....	611,425	75,993	4,020	691,438
May	....	590,489	53,787	17,941	662,217
June	....	147,724	32,338	139	180,201
Total	108,854	3,459,035	192,304	22,286	3,782,479

FIXED IRON.

	Bridge supports.	Caissons.	Floor.	Miscellaneous.	Total.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1914.					
August	2,838				2,838
September	66	43			109
October		68		143	211
November		2,790			2,790
December	4,156	58,902			63,058
1915.					
January	249	104,879			105,128
February	1,742	7			1,749
March		8,101			8,101
April		100,916	3,968		104,884
May		52,081	167,261		219,342
June		57,604	7,640	35	65,279
Total	9,051	385,391	178,869	178	573,489

BACK FILL.

	Bridge, wet.	Supports, dry.	Wharves, wet.	Miscellaneous, dry.	Total.
	Cu. yds.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
1914.					
July		23,614			23,614
August	2,580	7,470			10,050
September	9,300				9,300
November	466				466
1915.					
February		1,231			1,231
March		1,879		27	1,906
April		395			395
May				35	35
June			27,508		27,508
Total	11,880	35,055	27,508	62	74,505

PROGRESS OF CYLINDERS.

	Footing placed.	Penetration.	Footings to rock.	Concrete filler.	Reinforcing iron.	Footings complete.
1914.						
July	29	1,149	30			
August	5	749	2			
September	10	761	12	406	71,150	8
October	3	1,806	3	1,479	257,332	25
November	15	955	30	1,123	273,499	19
December	30	408	42	2,420	472,699	39
1915.						
January	71	1,579	27	2,297	492,931	32
February	36	1,771	24	309	87,397	
March	2	1,415	29	1,901	454,389	32
April		464	53	2,781	611,425	43
May		135	27	2,916	590,489	44
June	15	725	8	2,321	147,724	37
Total	216	11,917	287	17,953	3,459,035	279

EXCAVATION.

	Bridge supports.	Caissons.		Miscellaneous.	Total.
		Earth.	Rock.		
1914.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
July	951	1,155	....	....	2,106
August	166	1,499	150	....	1,815
September	56	506	70	....	632
October	28	1,050	30	28	1,136
November	....	1,925	244	....	2,169
December	....	227	885	....	1,112
1915.					
January	145	880	155	880	2,060
February	....	1,236	163	7	1,406
March	....	1,419	149	2,013	3,581
April	....	1,890	236	494	2,620
May	....	464	135	40	639
June	....	514	45	30	589
Total	1,346	12,765	2,262	3,492	19,865

Table showing summary of erection of wharf decking steel up to June 30, 1915.

	Unloader wharf.		Reloader wharf.	
	Erected.	Riveted.	Erected.	Riveted.
	Tons.	*Tons.*	*Tons.*	*Tons.*
February	700.0	257.6	....	....
March	253.4	695.8	1,095.0	1,095.0
April	1,201.4	316.2	....	....
May	63.2	948.4	791.0	296.0
June	252.0	252.0	734.0	885.0
Total	2,470.0	2,470.0	2,620.0	2,276.0

EAST BREAKWATER.

During the year Supervisor C. C. Snedeker has continued in immediate charge of construction work. Prior to July 1, 1914, 1,755 linear feet of single-track trestle and 2,470 linear feet of double-track trestle had been constructed. The double-track trestle began at station 12+11, and had been advanced to station 36+83, except that between bents 50 to 75 the trestle was single track. During July, 1914, 15 borings and 10 drop tests were made. This completed the investigation to determine the bearing power and the character of the material along the line of the east breakwater. From July 1, 1914, to February 8, 1915, the double-track trestle was advanced from station 36+83 from the shore to station 38+05 on the fill, a total of 6,048 linear feet; and from bents 50–75 a single-track trestle was driven, making the entire trestle double track. Fifty-one thousand four hundred and fifty-one linear feet of creosoted piling and 287,556 linear feet of untreated piling were driven; 13,262 linear feet of track were laid and 192 linear feet were removed; 3,155 linear feet of 3-inch water pipe and 3,595 linear feet of 2-inch water pipe were laid to supply water to the pile drivers.

On February 9, 1915, the double-track trestle was 85.6 per cent completed. Its construction began on March 2, 1914, and 9,498 linear feet of the double-track trestle that had been driven was in place, 142,195 linear feet of creosoted piling and 372,121 linear feet of untreated piling had been driven, 20,153 linear feet of track had been laid and 192 linear feet removed, 6,595 linear feet of 3-inch water pipe and 3,595 linear feet of 2-inch water pipe had been laid.

On February 9, 1915, a severe norther blew into Limon Bay during the early morning hours and did considerable damage. The trestle was carried away from station 17+97 to station 59+26, measured from the shore, and on the fill from station 21+00 to station 38+05, a total of 5,834 linear feet. Relay station No. 1 was partially wrecked. Work was immediately started in salvaging the trestle material and redriving a single track trestle.

On April 3–5, 1915, another severe norther visited Limon Bay, doing further damage to that part of the trestle which remained standing after the norther of February 9. The old trestle was destroyed from station 15+10 to station 17+97, measured from the shore, and on the fill from station 1+36 to station 21+00, a total of 2,251 linear feet. The two northers destroyed 85.1 per cent of the 9,498 linear feet of the double-track trestle which had been built. In addition, 396 linear feet of single-track trestle, containing 10,850 linear feet of piling, which was rebuilt after February 9 was entirely washed away.

After the norther of April 3–5, the original project for the trestle was changed. The following is an outline of the revised project that was approved:

	Linear feet.
Double-track trestle left standing (to station 15+10)	1,277
To build a single-track shore connection trestle	3,216
Then a double-track trestle, reaching the breakwater fill	1,200
On the breakwater proper a single-track trestle	3,300
Then a double-track trestle	1,990

This called for 6,516 linear feet of single-track trestle, and 4,467 linear feet of double-track trestle, in place of 10,983 linear feet of double-track trestle, as originally planned.

Work on the reconstruction of the trestle began on April 12, 1915, with Panama Railroad pile driver *No. 1*, and pile driver *No. 101*. Driver *No. 1* was started driving the single-track trestle at station 15+10. It had driven to June 30, 3,133 linear feet of single and 159 linear feet of double-track trestle on the shore section. The dredging division has followed up the pile driver as closely as possible with the discharge pipe of a suction dredge laid along the trestle, by which means coral rock and sand is being pumped in to elevation −15 to stiffen the single-track trestle and to increase its resistance to storms. In redriving this trestle, piles longer than 85 feet could not conveniently be used with the driver available. In the original trestle spliced piles were driven to hard bottom, which was sometimes as low as elevation −115. To obtain the necessary additional bearing power with 85-foot piles, wooden collars 42 inches square were therefore used, dapped into and bolted to the piles at the proper height to rest on the bottom. On May 21 Driver *No. 101* was placed on the outer trestle at station 1+36 and began driving the trestle for the breakwater fill on May 24. This trestle had no land connection, and was 1.1 miles from shore. It is being driven on the core fill which had been dumped previous to February 9. One thousand four hundred and twenty-five linear feet of single-track trestle had been driven to June 30. Under the revised project the trestle has been built from the shore to station 48+02, and on the fill from station 0+00 to station 15+61. Fifty-five per cent of the entire length of the new trestle was completed on June 30.

Since the norther of April 3–5, 4,558 linear feet of single-track and 159 linear feet of double-track trestle have been driven; 22,760 linear feet of creosoted piling (secondhand), 18,642 linear feet of untreated piling (secondhand), and 57,130 linear feet of untreated piling (new) have been driven; 4,876 linear feet of track have been laid, and 3,092 linear feet of 3-inch water pipe have been laid.

The pile drivers worked 12 hours per day with split shifts from July 1 to September 30, 1914, and from June 1 to 30, 1915, and 8 hours per day from October 1, 1914, to May 31, 1915.

Salvaging material.—Immediately after the norther of February 9, gangs were started salvaging the trestle material which was washed up on the shores of Limon Bay. There had been salvaged to June 30, 894,539 feet b. m. of stringers, caps, ties, and filler blocks; 41,400 linear feet of creosoted piling; 58,380 linear feet of untreated piling. The greater part of this material will be used in the construction of the trestle. The material that can not be used for its original purpose will be cut up into braces, ties, filler blocks, and car stakes.

Pile drivers.—Pile drivers *No. 103* and *No. 104* were lost with the trestle in the norther of February 9. Driver *No. 103* was salvaged in May by forces of the dredging division with the aid of the *Hercules*. Only the car body and trucks of driver *No. 104* were recovered. These salvaging operations cost $4,611.13. Driver *No. 103* was sent to the Balboa shops for repairs and returned on June 19, ready to resume work.

A new pile driver, *No. 105*, was ordered in the United States at a cost of $13,550. It arrived on the Isthmus on June 9.

Cost of northers.—The net effect of the two northers will be to increase the cost of the east breakwater about $370,000.

Equipment lost in the norther.—In addition to the two pile drivers, there were also lost in the norther of February 9, 23 Lidgerwood cars, 1 unloader, and 1 plow; a box car used as a tool car for the trestle gangs; and 2 push cars equipped with lights as beacons on the end of the trestle. Some of the equipment will be salvaged.

Dry fill.—Dry fill was started September 16, 1914, and was stopped by the norther on February 9, 1915. The rock was obtained from the Sosa Hill quarry, and was plowed from Lidgerwood cars into the fill. There were placed in the breakwater fill 318,778 cubic yards of core rock, and 2,368 cubic yards of armor rock (car measurement). The dry fill was distributed between stations 0 and 35+75. For the greater part of this distance, the core fill had been carried up to or a little above sea level on the sea side of the trestle and to within 10 feet of the surface on the harbor side. The effect of the northers was to level off this core rock very uniformly at a depth of from 10 to 14 feet below sea level and to make a broad platform, in some cases 120 feet wide with flat slopes on which to dump the armor rock. The difference between the volumes calculated from cross sections taken before and after the northers was 62,221 cubic yards, or about 13 per cent, which represents the amount of material carried away or lost by settlement by the action of the northers.

Wet fill.—The first wet fill was placed in the breakwater by the dredging division on September 22, 1914. The following is a statement of the amount placed:

	Cubic yards.
Hydraulic fill placed by suction dredge	171, 177
Hard material dumped from scows	126, 323
Soft material dumped by *Caribbean*	1, 014, 455

Sawmills.—A new log sawmill was received from the United Sates in May. The new sawmill in addition to the one located at the Coco Solo shop is supplying the trestle construction forces with the necessary braces, filler blocks, and bridge ties by cutting up the salvaged piling and lumber, thereby avoiding the ordering of considerable new lumber for the purpose.

Miscellaneous.—During the year 19 acres were cleared along the right of way of the Margarita Railroad connection. Nineteen thousand five hundred and fifty-six cubic yards of rock fill and 23,057 cubic yards of hydraulic fill were placed in the fill at relay station No. 1 to protect the station against heavy sea. Five thousand four hundred cubic yards of rock fill and 35,758 cubic yards of hydraulic fill were placed along the trestle at bents 38 to 65 to protect dredge *No. 4* from heavy seas while it was acting as a relay for dredge *No. 83*. Dredge *Marmot* excavated 26,016 cubic yards of coral rock from Coco Solo Harbor, making the channel 250 feet wide. This material was dumped on the breakwater. Dredge *No. 4* pumped 5,074 cubic yards of hydraulic fill in the pile yard. This additional space was necessary in order to handle the salvaged material. Twelve thousand eight hundred and twenty-two linear feet of untreated piling were driven for the maintenance of the trestle prior to February 9. Five thousand nine hundred and sixty-seven cubic yards of armor rock were stored in Coco Solo yard, and 656 cubic yards are on cars in Coco Solo yard (car measurement). Six hundred and forty-eight linear feet of new track were laid in the material yard. The maintenance of the Margarita main line and the Coco Solo yard tracks were transferred to the Panama Railroad on September 1, 1914.

Relay station No. 1 was completed in December, 1914, using 2,510 linear feet of untreated piling in the foundation. It was destroyed by the northers. In June the piles for the foundation of relay station No. 1 were redriven, using 1,350 linear feet of untreated piling (secondhand). The building was completed and the pump and motor have been installed. The electrical division is doing the electrical work. Work on relay station No. 2 was begun in January. Foundation piles had been driven, capped, and decked with the floor at the time of the first norther. One thousand five hundred and ninety-five linear feet of piling were driven. This station was damaged by the northers and has not yet been rebuilt.

Since February 9, 81,142 cubic yards of hydraulic fill, 127,243 cubic yards of hard-dredged material (dumped by scows), and 230,131 cubic yards of soft-dredged material (dumped by the *Caribbean*) have been placed on the axis of the trestle from bent 82 to 260.

During the northers of February 9 and April 3–5, it is estimated that 20,884 cubic yards (solid) of rock were also washed out of the finished section of the west breakwater. This damage is distributed at the following stations:

	Cubic yards.
Stations 40 to 76 (solid)	6, 133
Stations 88 to 90 (solid)	2, 228
Stations 94 to 107 (solid)	10, 937
Stations 113+50 to 114+76 (solid)	1, 586

PIER NO. 7, CRISTOBAL.

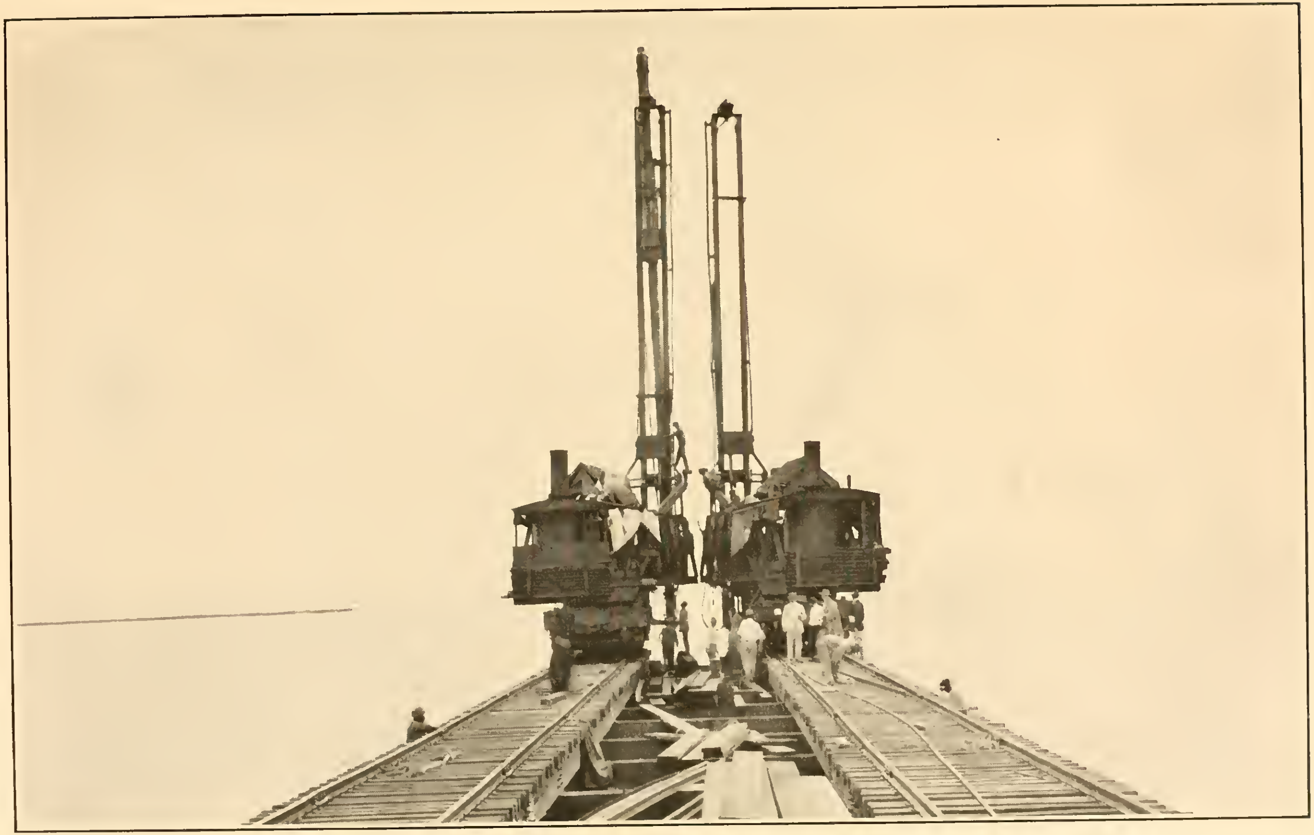
This pier is being constructed by the Panama Railroad at its own expense. During the year Engineer of Docks T. B. Monniche continued in charge of all work, including design, field engineering, construction and inspection, reporting to the engineer of terminal construction. Assistant Engineer Starr Truscott has been in charge of the office force, and Supervisor C. A. Nelson has been in charge of the construction forces. Junior Engineer G. L. Rounds was in charge of field engineering to March 25, from which time Junior Engineer F. J. Fitzpatrick has been in charge.

This pier, parallel to Pier No. 8, has a width of 212 feet; and a length of 1,135 feet on the south side, and 1,077 feet on the north side as regards 41-foot depth of water. The work has progressed steadily. Construction trestles were completed in February, 1915. The first steel cylinders were set in September, 1914; excavation in the cylinders started in October, and filling with concrete began in December. Up to the end of the year 88 per cent of the cylinders, or 22,900 feet, were in place; the excavation was 82 per cent completed; 17,119 cubic yards of concrete, or 73 per cent of the total, had been placed in the cylinders. Drawings for the steel-floor system were completed. This steel, amounting to about 5,500 tons, is being furnished and erected by the United States Steel Products Co. The steel drawings for the pier shed were completed and requisition was forwarded in May, 1915. At the end of the year drawings and requisitions for the doors, roofing, louvers, and other details of the pier shed had been completed and forwarded, and it was estimated that the pier as a whole was about 40 per cent completed.

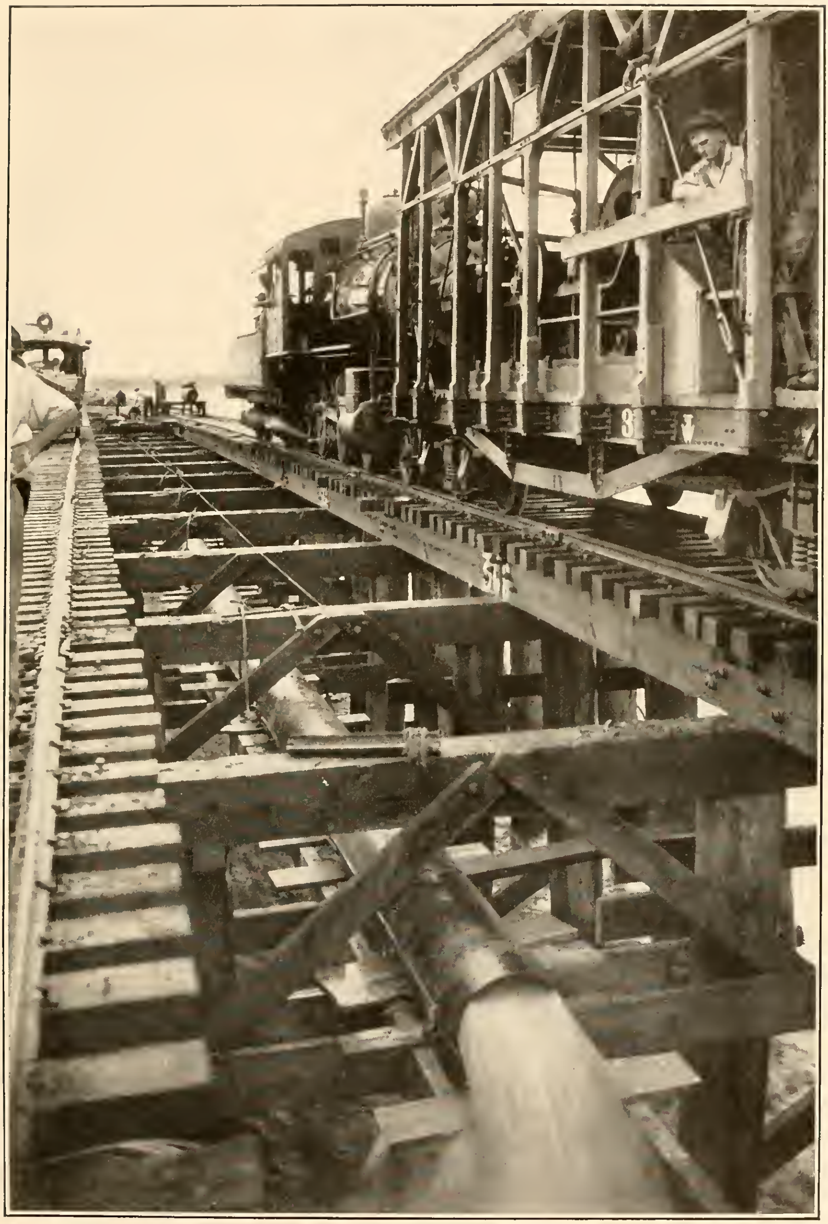
The following is a list of drawings accompanying this report:

Plate No.	Drawing No.	Description.
93	X–3502–1	General Plan, Pacific Terminals.
94	5012–1	General Plan, and Typical Cross-Section, Naos Island Breakwater.
95	4362	General Plan and Section Dry Dock No. 1, Balboa.
96	4312	Pumping Plant and Operating Valves, Dry Dock No. 1, Balboa—General Arrangement.
97	4353	Stresses in Side Walls Dry Dock No. 1, Balboa.
98	5077–D	General Plan of One Gate Leaf 56 Feet High, Dry Dock No. 1, Balboa.
99	3001–1	Dry Dock No. 1, Balboa—Plan and Sections Showing Concrete Mixing and Handling Plant.
100	3001–2	Entrance Pier—Concrete Mixing Plant.
101	3001–3	Typical Section Showing Character of Excavation for Dry Dock No. 1 and Entrance Basin.
102	220–E	Detail of 4-foot Lift Forms for Dry Dock Walls.
103	329–B	Traveling Concrete Mixing Tower and Distributing Chute.
104	3518–1	Construction Plant for Quay Wall E–F and Reloader Wharf (Docks 14 and 6) Balboa.
105	3551–2	Construction Plant for Pier No. 18, Balboa.
106	3503–1	General Data Sheet—Dimensions, Construction and Cost of all Terminal Docks and Piers.

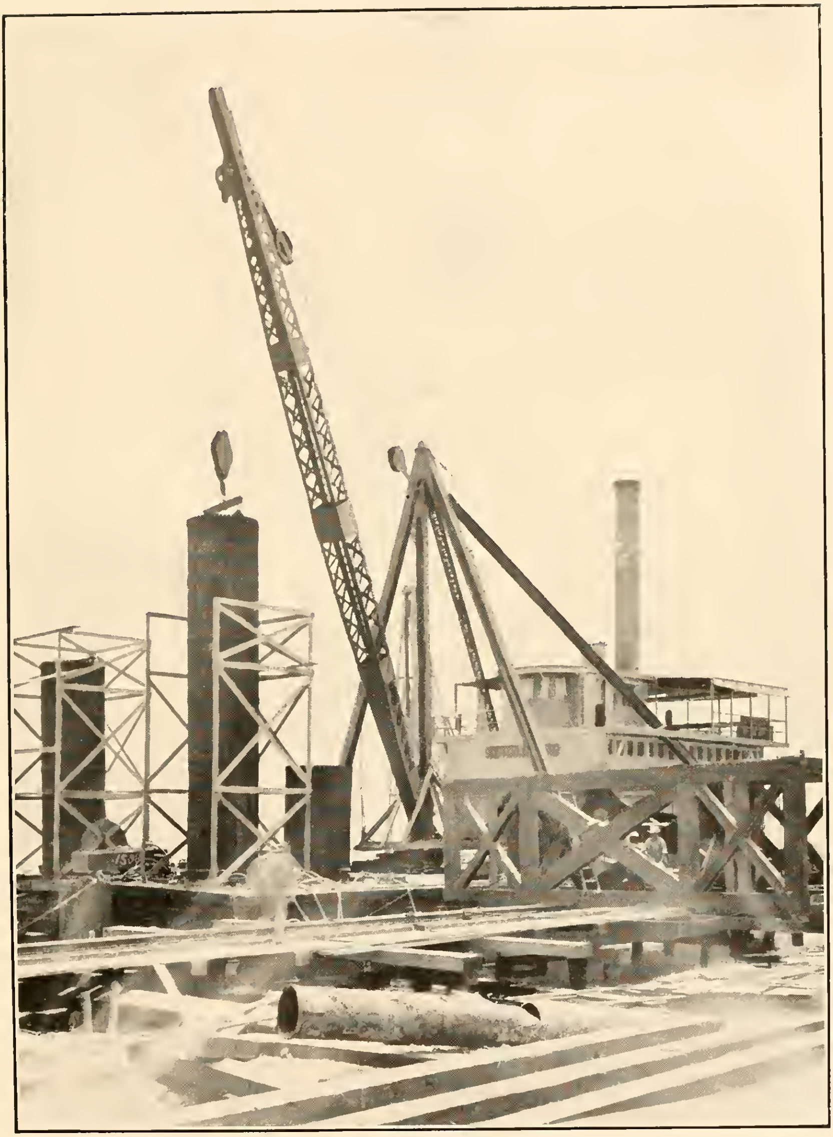
PLATE 32.



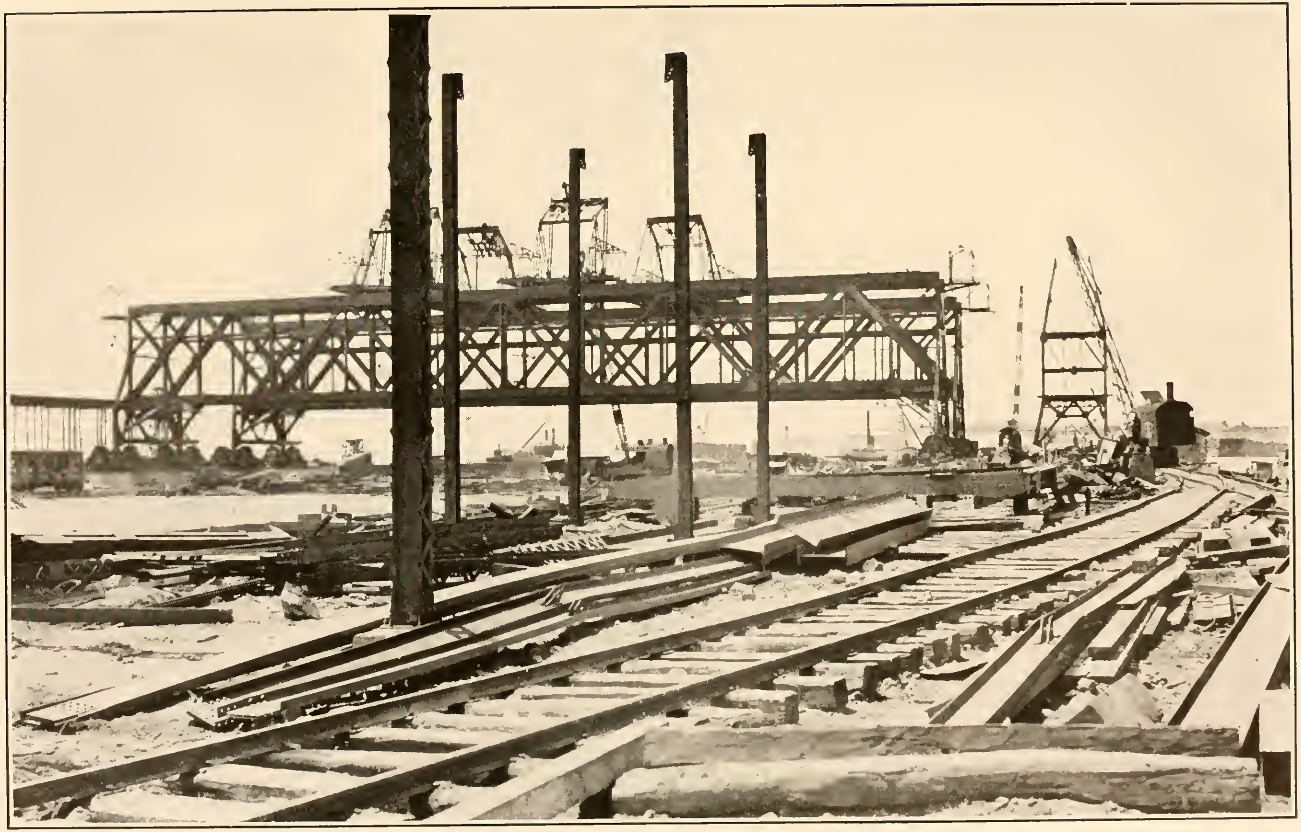
ATLANTIC TERMINALS. EAST BREAKWATER. PILE DRIVERS NOS. 103 AND 104 DRIVING BENT NO. 479. SEPTEMBER 26, 1914.



ATLANTIC TERMINALS. EAST BREAKWATER. DREDGE NO. 4 DISCHARGE AT STATION 1+52"C". SEPTEMBER 26, 1914.

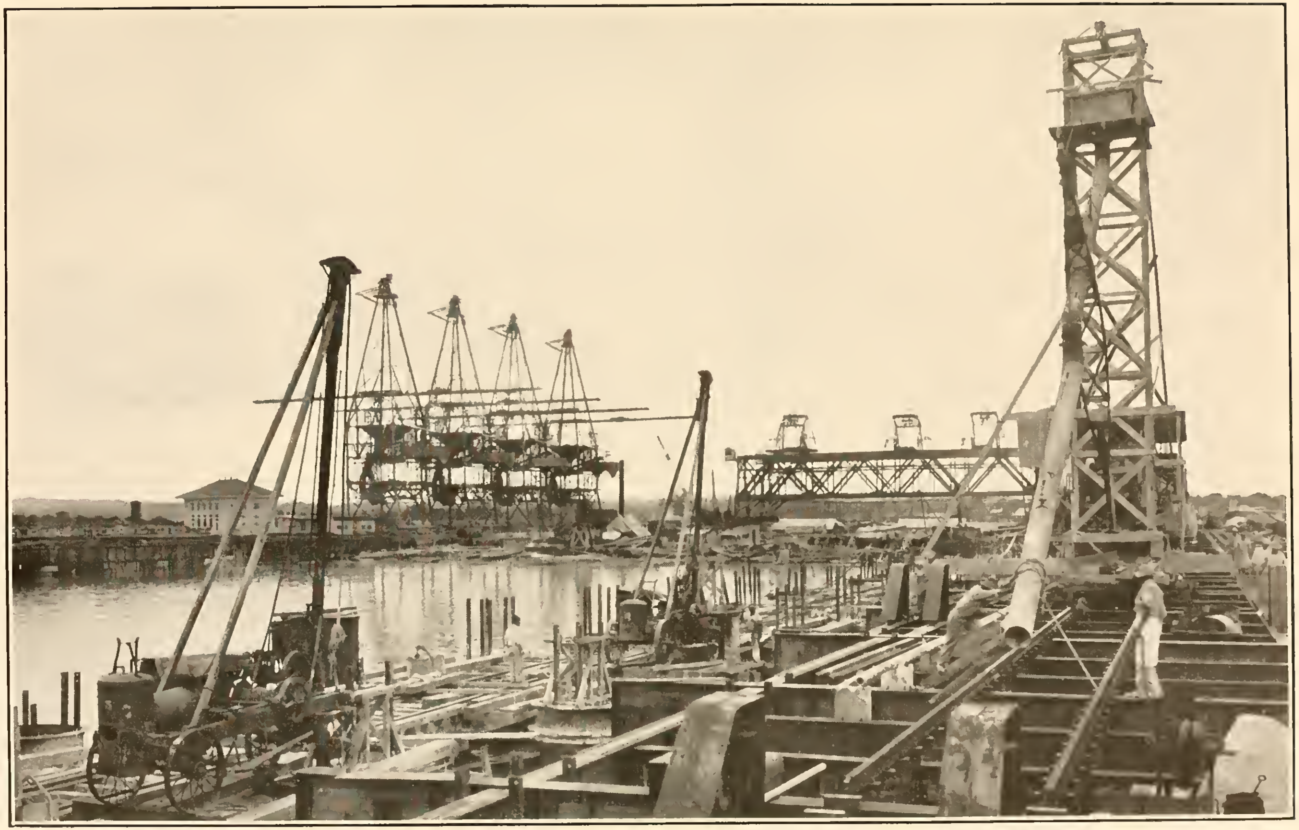


CRISTOBAL COALING STATION. CAISSON SETTING FOR RELOADER WHARF, SHOWING DERRICK BARGE IN USE FOR ASSEMBLING AND SETTING SHELLS. AUGUST 6, 1914.

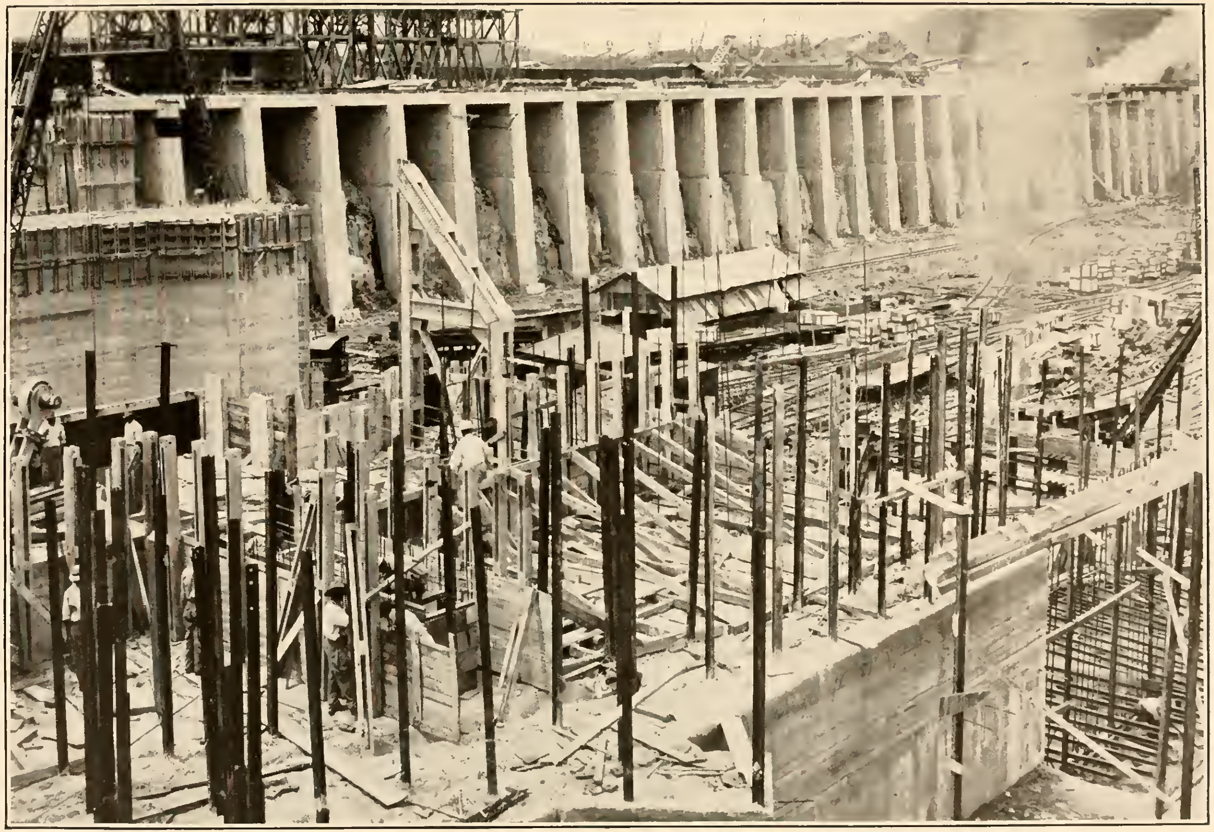


CRISTOBAL COALING STATION. VIEW LOOKING NORTH OR EAST SIDE OF COAL STORAGE, SHOWING BRIDGES, FIRST UNLOADER TOWERS, AND CONDITION OF VIADUCT. MARCH 11, 1915.

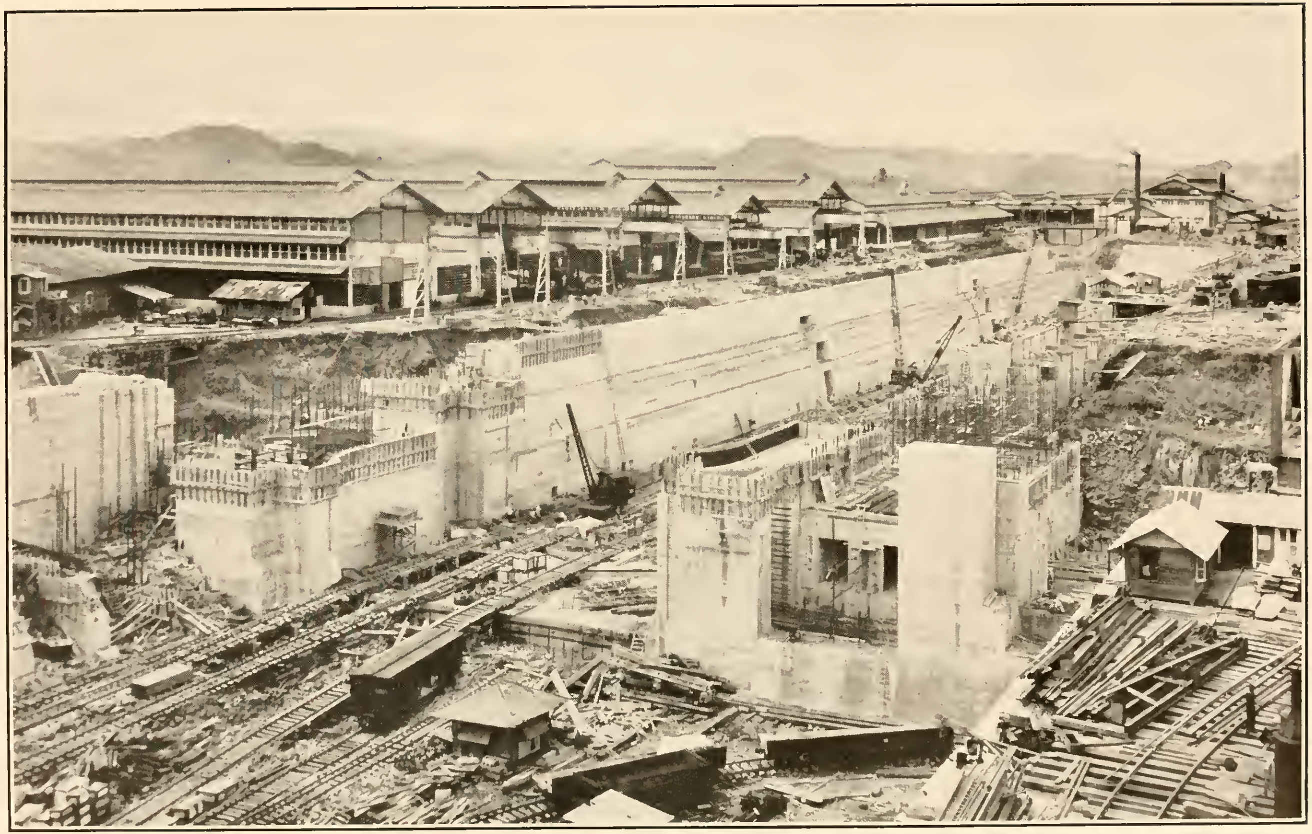
PLATE 36.



CRISTOBAL COALING STATION. LOOKING SOUTH FROM THE NORTH END OF RELOADER WHARF. JUNE 12, 1915.

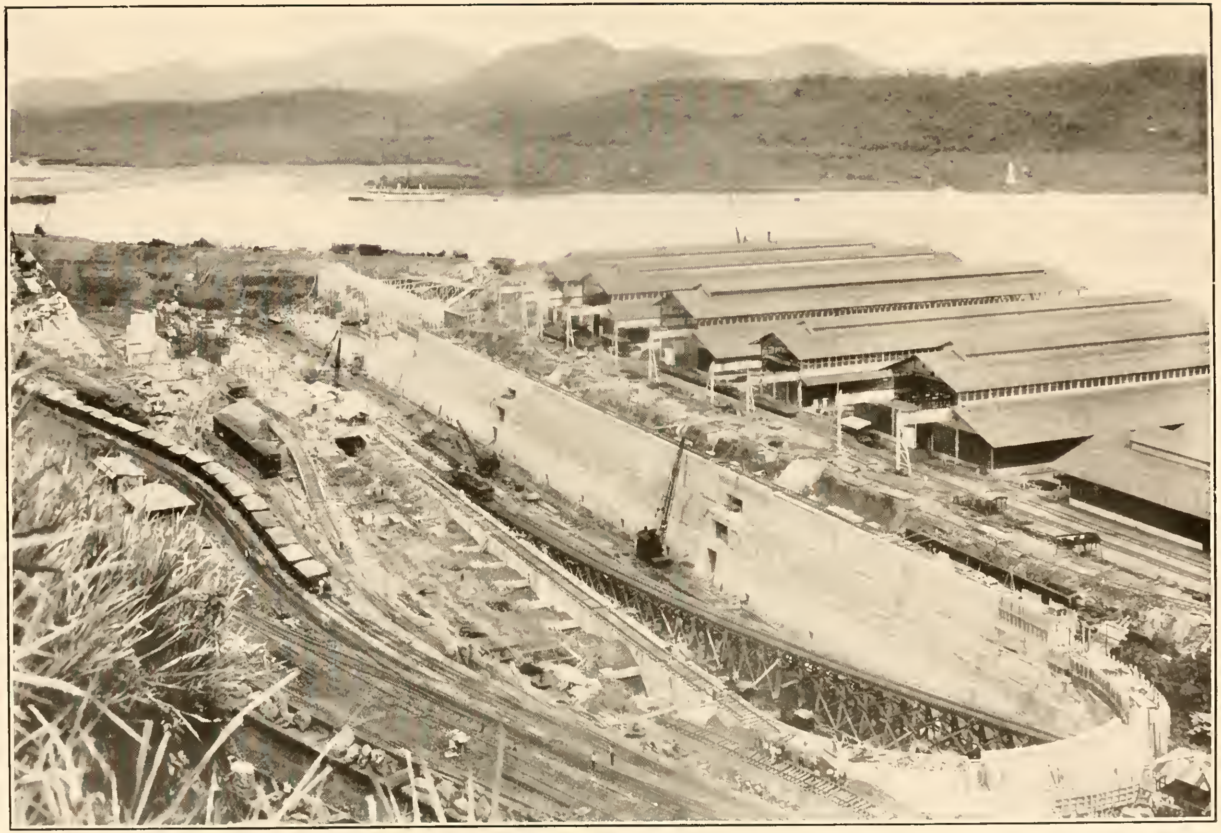


BALBOA TERMINALS. DRY DOCK NO. 1. MITER GATE ANCHORAGES, NORTH WALL. MAY 12, 1915.



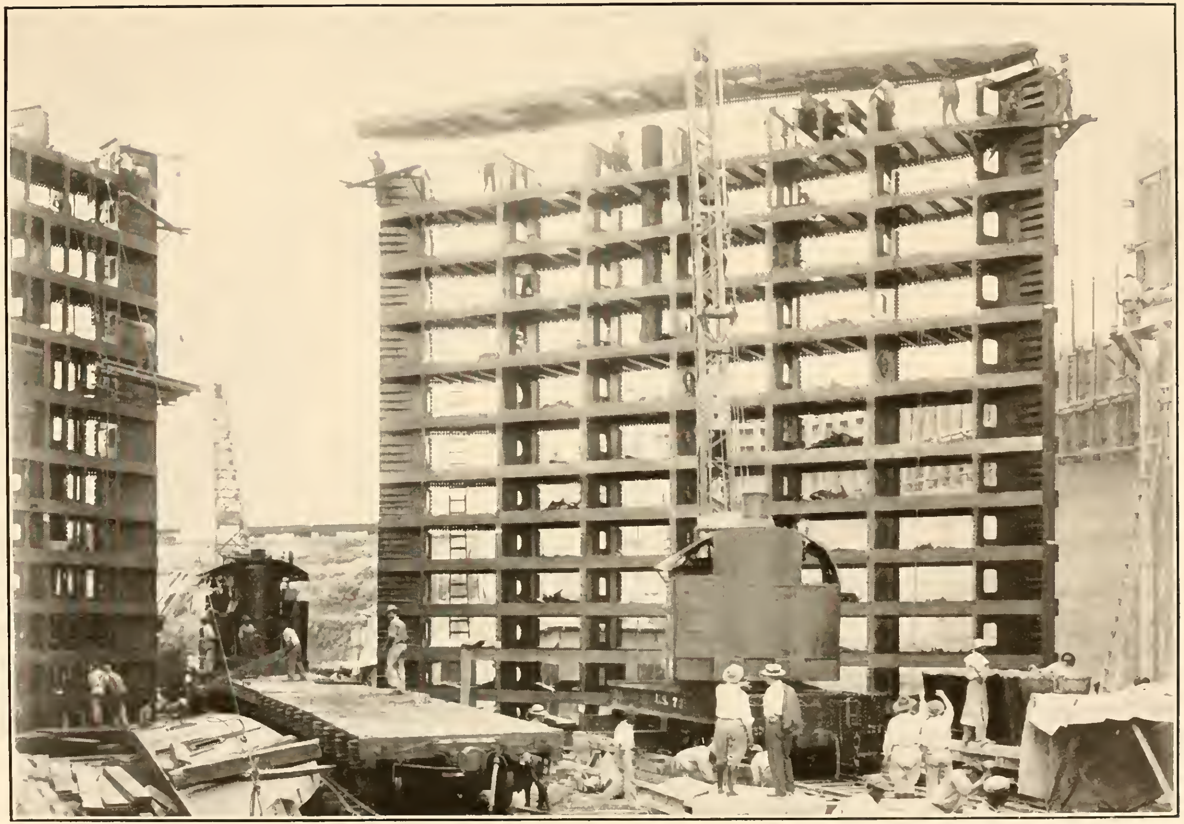
BALBOA TERMINALS. GENERAL VIEW FROM COAL CRANES, LOOKING NORTH AND WEST, SHOWING ENTRANCE TO DRY DOCK NO. 1. JUNE 5, 1915.

PLATE 39.



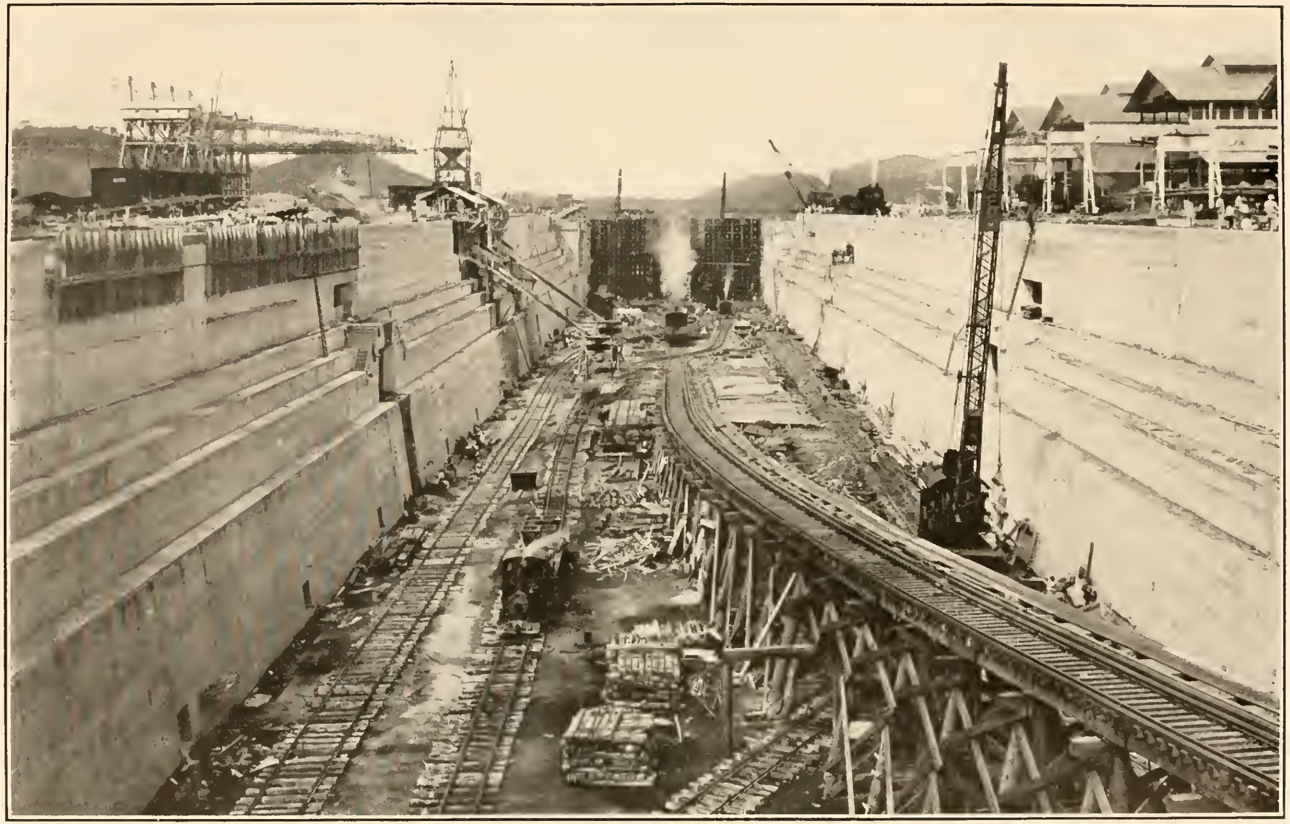
BALBOA TERMINALS. DRY DOCK NO. 1, LOOKING WEST FROM SOSA HILL, SHOWING ENTRANCE BASIN AND COFFERDAM. JUNE 10, 1915.

PLATE 40.



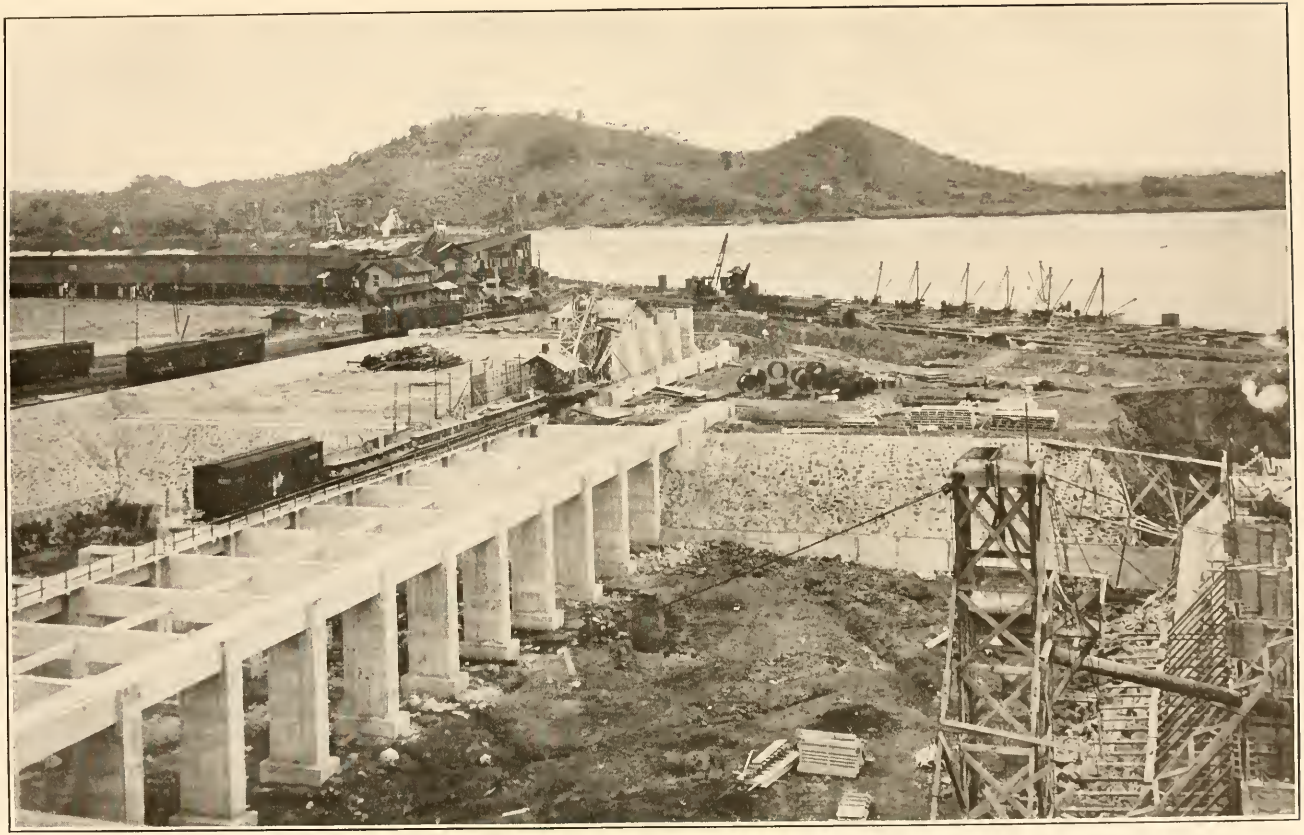
BALBOA TERMINALS. DRY DOCK NO. 1. CONSTRUCTION OF NORTH GATE. PLACING TOP GIRDER. JUNE 23, 1915.

PLATE 41.

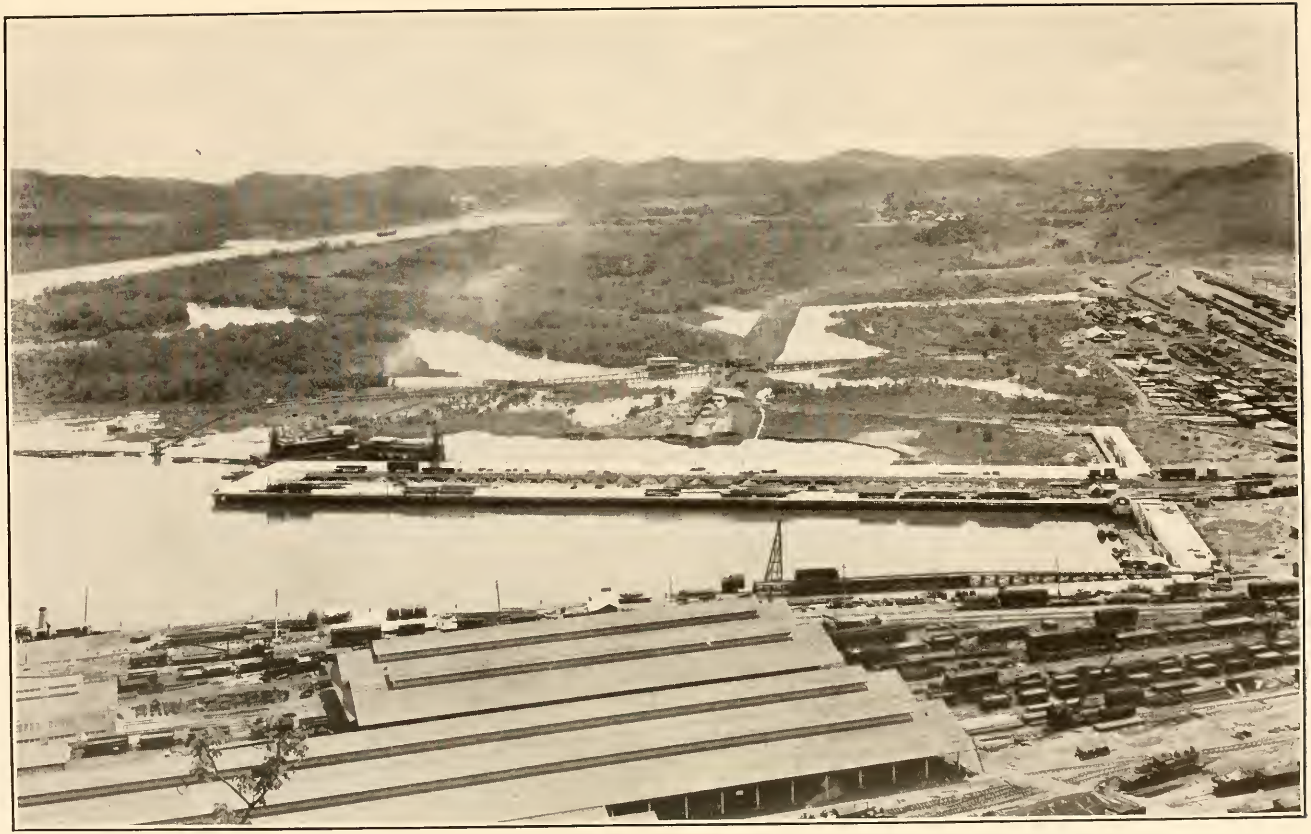


BALBOA TERMINALS. DRY DOCK NO. 1. LOOKING TOWARD ENTRANCE GATES. JUNE 30, 1915.

PLATE 42.

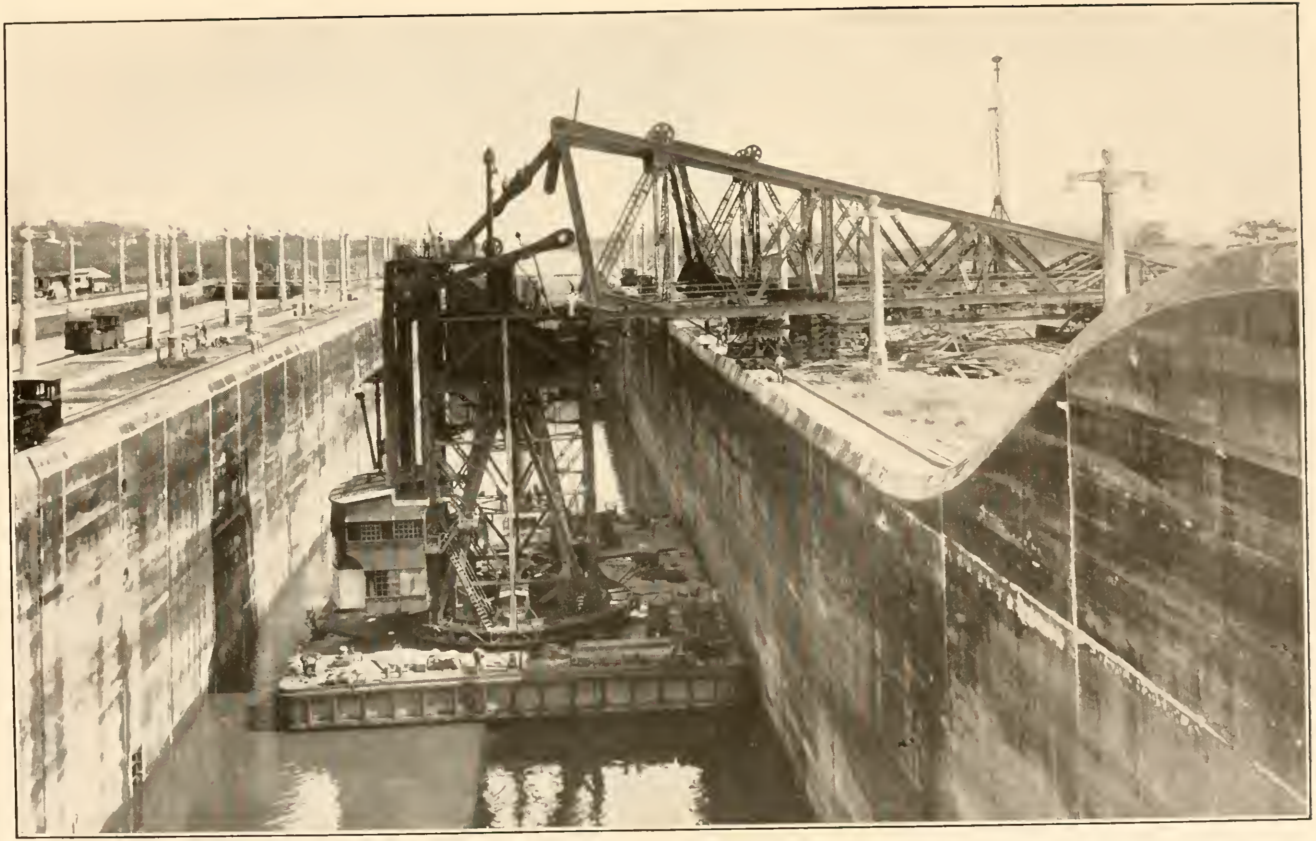


BALBOA TERMINALS. BERM CRANE SUPPORTS, VIADUCT POSTS, AND RETAINING WALL AT COALING STATION.
JUNE 5, 1915.

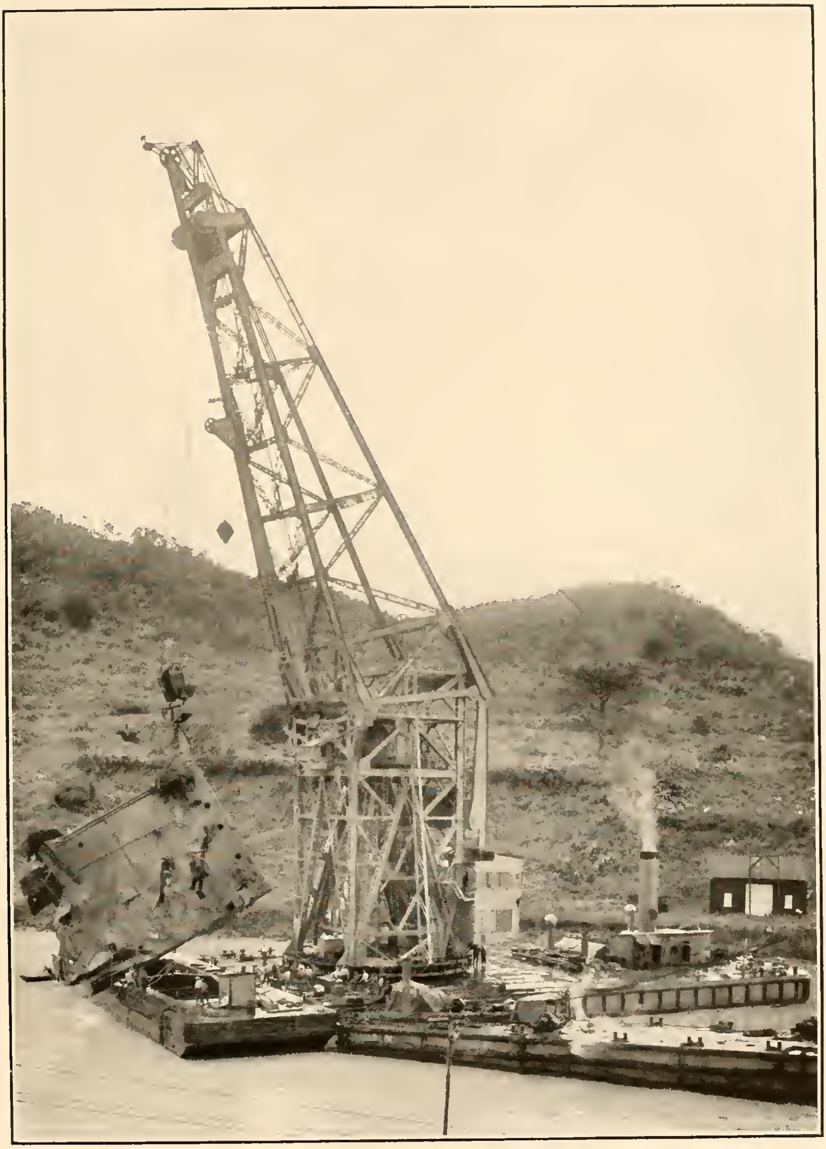


BALBOA TERMINALS. GENERAL VIEW FROM SOSA HILL LOOKING NORTH. DREDGING IN SLIP NO. 2. JUNE 8, 1915.

PLATE 44.

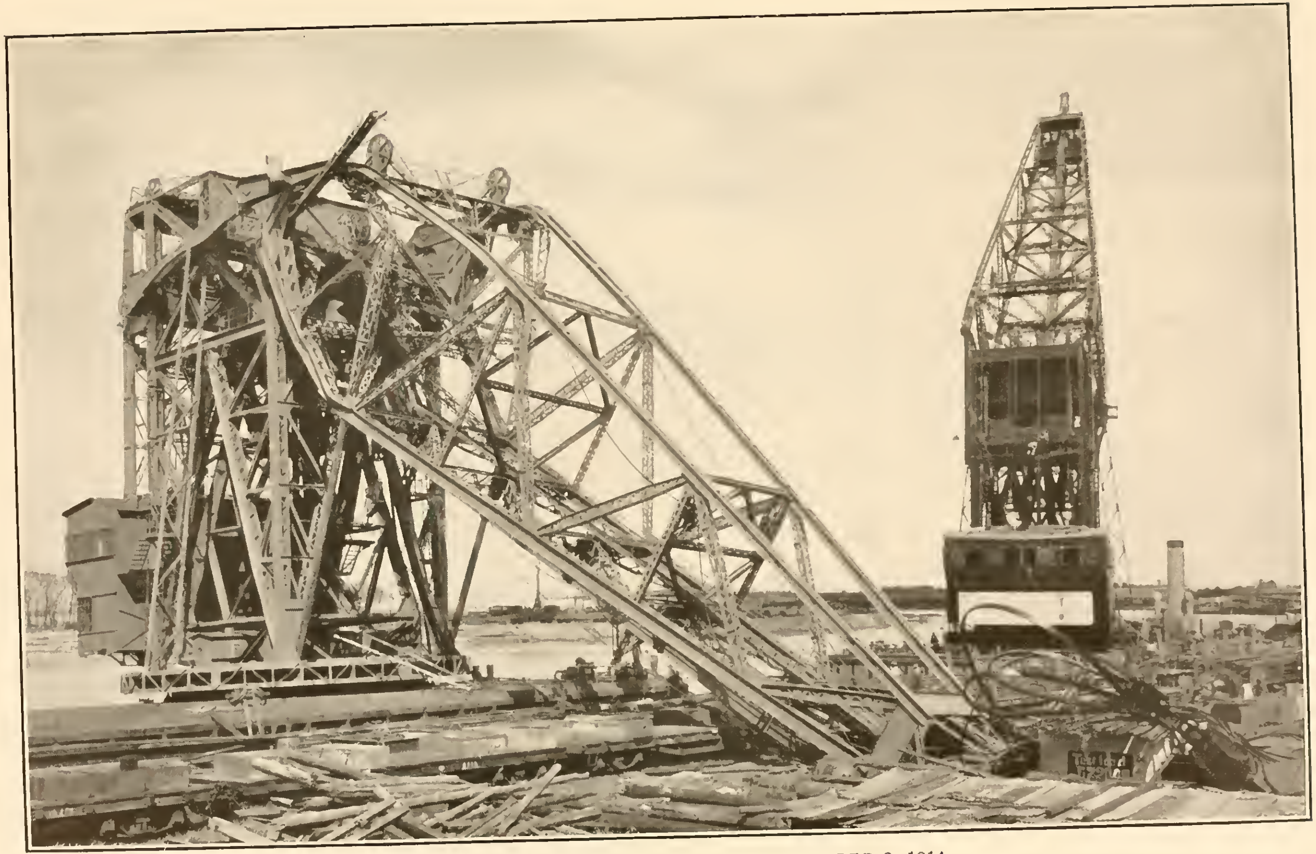


PINNING JIB ON CRANE "AJAX" IN MIDDLE CHAMBER OF GATUN LOCKS. OCTOBER 9, 1914.

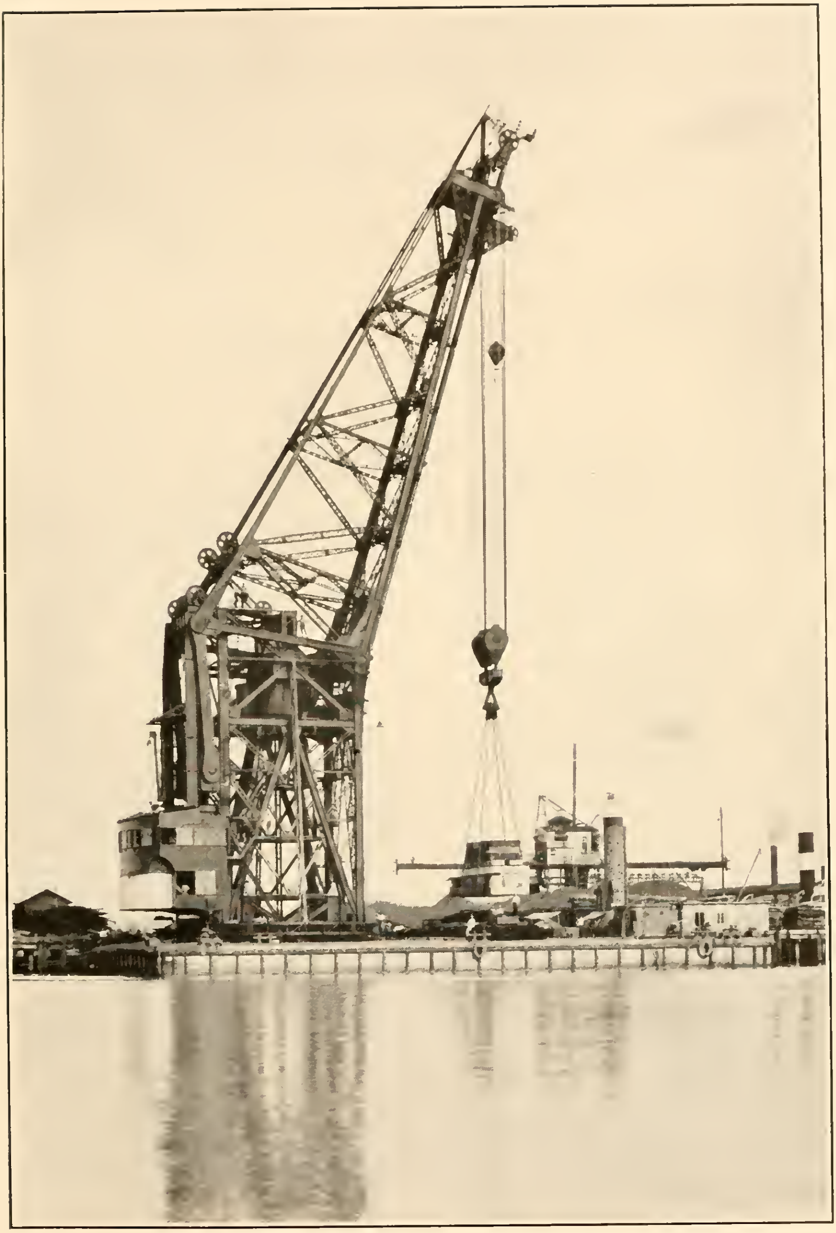


FLOATING CRANE "AJAX" REMOVING SMALLER PORTION OF WRECKED DRILL BARGE "TEREDO" AT CABLE CROSSING, GAILLARD CUT. NOVEMBER 17, 1914.

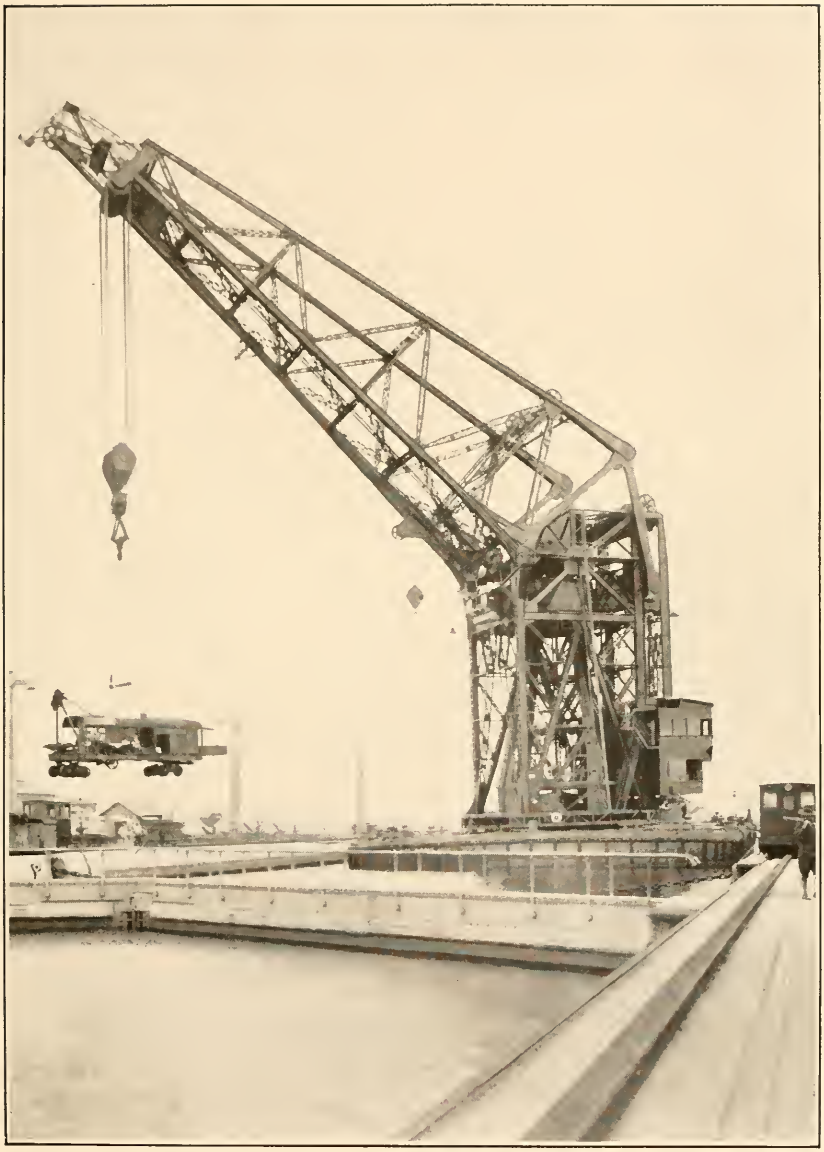
PLATE 46.



WRECKED JIB OF CRANE "AJAX". DECEMBER 8, 1914.



FLOATING CRANE "HERCULES." TRIAL OF 300-TON LOAD ON DECK, 250 TONS SUSPENDED AT RATED REACH. MARCH 19, 1915.



FLOATING CRANE "HERCULES" TRANSFERRING EQUIPMENT ACROSS GATUN LOCKS FROM EAST SIDE. STEAM SHOVEL SUSPENDED IN AIR. APRIL 10, 1915.

Plate No.	Drawing No.	Description.
107	3503–2	Typical Sections of Docks and Piers—Pacific Terminals—Sheet No. 1.
108	3503–3	Typical Sections of Docks and Piers—Pacific Terminals—Sheet No. 2.
109	3503–4	Typical Sections of Docks and Piers—Pacific Terminals—Sheet No. 3.
110	14478	General Layout, Pier No. 18, and Pier Shed, Balboa.
111	11908	General Plan, Cristobal Terminal Docks, Piers and Mole.
112	11001	Typical Section, Pier No. 7, Cristobal.
113	4196	Fuel Oil Storage—Typical Plan and Elevation, Oil Handling Plants.
114	4197	Detail Plan, Pacific Tank Lots.
115	4198	General Plan, Atlantic Terminal Oil Plant.
116	4199	General Plan, Pacific Terminal Oil Plant.

Respectfully submitted.

H. H. Rousseau,
Civil Engineer, United States Navy,
Engineer of Terminal Construction.

Maj. Gen. Geo. W. Goethals, *United States Army,*
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

APPENDIX C.

REPORT OF THE RESIDENT ENGINEER, DREDGING DIVISION, DEPARTMENT OF OPERATION AND MAINTENANCE.

PARAISO, CANAL ZONE, *July 28, 1915.*

SIR: I have the honor to submit the following report of operations in the dredging division during the fiscal year ended June 30, 1915.

DIVISION ORGANIZATION.

The division is divided into two districts, the first district embracing all dredging operations in the Pacific entrance, Miraflores Lake, and Gaillard Cut; the second district, all dredging operations in the Atlantic entrance and Gatun Lake to the Gamboa Bridge.

DREDGING.

The following dredges were at work during the year:

The seagoing suction dredge *Culebra* was engaged in deepening the channel, between stations 2286 and 2302, Pacific entrance, and in excavating berths for oil vessels at the new oil dock, Balboa, from July 1 to 14, 1914; temporarily laid up at Paraiso from July 15, 1914, to April 15, 1915; reentered service and was engaged maintaining channels at the Atlantic and Pacific entrances, Gaillard Cut, and along Pier 4, Balboa, from April 16, 1915, to June 30, 1915.

The seagoing suction dredge *Caribbean* was engaged in maintaining the required depths in the Atlantic entrance, Cristobal approach channel, and Cristobal Harbor, from July 1, 1914, to April 15, 1915; retired from service on April 16, 1915, and was laid up at Paraiso for the remainder of the year.

The 18-inch pipe-line dredge *No. 4* was engaged during the year in deepening the channel between stations 211 and 245, Atlantic entrance; filling around the fortifications at Toro Point; filling the pile and material yards and the core of the east breakwater at Coco Solo Point, and acting as a relay for dredge *No. 83* on the east breakwater.

The 20-inch pipe-line dredge *No. 82* was engaged in deepening the Balboa inner harbor, July 1, 1914, to November 29, 1915; operated at the sand and gravel beds in the Chagres River, and deepening the berth in front of the Gamboa sand and gravel dock, November 30, 1914, to June 30, 1915.

The 20-inch pipe-line dredge *No. 83* was engaged during the year in excavating the coal-storage basin at the Cristobal coaling station;

maintaining the required depth in Cristobal Harbor; filling around the fortifications at Toro Point and filling the core of the east breakwater at Coco Solo.

The 20-inch pipe-line dredge *No. 84* (*Sandpiper*) was engaged during the year in filling around the fortifications at Margarita Island; excavating the Balboa inner harbor; deepening the coal slip and turning basin, Cristobal Harbor; and excavating for the Atlantic terminals.

The 20-inch pipe-line dredge *No. 85* was engaged during the year in excavating the Balboa inner harbor; sluicing mud and soft material from under Pier 18 and the reloader wharf at Balboa; and filling around the fortifications at Toro Point.

The 20-inch pipe-line dredge *No. 86* was engaged during the year, deepening the channel at Cucaracha and Culebra slides, and Gamboa Dike in Gaillard Cut; excavating the Balboa inner harbor; deepening the channel through Miraflores Lake, and placing a blanket fill over the north face of Miraflores Dam.

The 15-cubic-yard dipper dredge *Gamboa* was operated the entire year in Gaillard Cut, maintaining and deepening the channel at Cucaracha and Culebra slides and assisting in the wrecking of the drill barge *Teredo* at Cucaracha on July 22, 27, 28, 1914.

The 15-cubic-yard dipper dredge *Paraiso* was operated the entire year in Gaillard Cut, maintaining and deepening the channel at Cucaracha and Culebra slides and assisting in the wrecking of the drill barge *Teredo* at Cucaracha, July 22 to 29, 1914.

The 5-cubic-yard dipper dredge *Cardenas* was operated during the year in maintaining and deepening the channel at Cucaracha, Culebra, Empire, and La Pita slides, and excavating the 65-foot berm in Gaillard Cut.

The 5-cubic-yard dipper dredge *Chagres* was operated during the year in maintaining and deepening the channel at Cucaracha, Culebra, and La Pita slides in Gaillard Cut.

The 5-cubic-yard dipper dredge *Mindi* was operated during the year in maintaining and deepening the channel at Cucaracha, Culebra, and La Pita slides in Gaillard Cut.

The seagoing ladder dredge *Corozal* was engaged during the year in maintaining and deepening the channel at Cucaracha and Culebra slides in Gaillard Cut and excavating rock and hard clay from between stations 2112 and 2149, Pacific entrance.

The French ladder dredge *No. 1* was engaged during the year deepening and maintaining the channel at Cucaracha slide, Gaillard Cut; deepening the Cristobal approach channel; excavating alongside the Gamboa gravel dock; excavating sand and gravel from the Chagres River gravel beds.

The French ladder dredge *No. 5* was engaged during the year excavating rock and stiff clay from stations 2119 to 2120 and 2133 to 2143, Pacific entrance; deepening berths along Pier 4, Balboa; excavating the Balboa Inner Harbor.

The French ladder dredge *Badger* was operated in Balboa Inner Harbor from July 1, 1914, to August 1, 1914, on which date it was permanently retired from service.

The French self-propelling ladder dredge *Gopher* was operated in the Chame sand pit from July 1, 1914, to October 20, 1914, excavating rock and clay from the channel, stations 2151 to 2155 and 2180 to 2183, Pacific entrance; deepening Balboa Inner Harbor and maintaining the required depths along the Panama Railroad wharf at Balboa from October 21, 1914, to June 30, 1915.

The French ladder dredge *Marmot* was engaged during the year deepening the channel, stations 2066 to 2069, Pacific entrance; deepening and maintaining the channel at Culebra slide and Gamboa Dike in Gaillard Cut; excavating Balboa Inner Harbor; at the Cristobal coaling station, Coco Solo Harbor, and the Cristobal approach channel.

The drill barge *Teredo* was operated at Cucaracha slide from July 1, to 20, 1914, on which date it was blown up and sunk in the canal channel. The drills and machines recovered from the wreck were remounted on a remodeled sand barge at the Paraiso shops and new drilling outfit was named *Teredo 2*. The *Teredo 2* went into commission on November 27, 1914, operating at Cucaracha and Culebra slides in Gaillard Cut and in the channel at the Pacific entrance; furnishing steam for shore drills at Gold Hill May 11 to 16, 1915.

The rock breaker *Vulcan* was operated on rock shoals, Pacific entrance, Balboa Inner Harbor, Cucaracha slide in Gaillard Cut, July 1, 1914, to March 17, 1915; out of commission for repairs and alterations March 18 to June 15, 1915; Balboa Inner Harbor June 16 to 30, 1915.

The hydraulic grader went into commission on August 24, 1914, and was engaged in grading down the canal banks from station 1622 to 1645 west, at Cucaracha slide, Culebra slide, and Gold Hill, in Gaillard Cut; cutting ditches for draining the Obispo diversion; sluicing mud from beneath Pier 18 and the coal reloader wharf at Balboa, and on May 7 to 8, 1915, standing by steamship *Pennsylvanian* on fire at the dock in Balboa.

The following table shows the output of all dredges operated during the year with total and unit costs of same:

Dredge.	Output.			Cost.	Unit cost.
	Earth.	Rock.	Total.		
	Cubic yards.	*Cubic yards.*	*Cubic yards.*		
Culebra	352,184		352,184	$67,387.18	$0.19134
Caribbean	1,870,873		1,870,873	157,077.10	.08396
No. 4	317,254	6,650	323,904	134,667.71	.41576
No. 82	603,696	50	603,746	151,057.31	.29987
No. 83	589,680	64,954	654,634	145,015.31	.22152
No. 84	790,807	26,846	817,653	139,448.31	.17054
No. 85	1,374,379		1,374,379	239,002.31	.17390
No. 86	1,053,177	92,853	1,146,030	281,156.79	.24533
Gamboa		1,825,122	1,825,122	628,901.11	.34458
Paraiso		1,739,228	1,739,228	611,414.02	.35156
Cardenas	2.869	462,505	465,374	210,660.61	.45267
Chagres		353,619	353,619	166,485.61	.47081
Mindi	1,416	400,294	401,710	180,585.96	.44954
Corozal	224,833	821,191	1,046,024	459,204.61	.43900
No. 1	276,463	30,205	306,668	87,328.28	.28476
No. 5	370,566	63,410	433,976	125,109.59	.28829
Badger	52,992	23,378	76,370	15,980.55	.20925
Gopher	145,799	45,525	191,324	120,414.75	.62932
Marmot	30,562	315,743	346,305	116,895.95	.33755
Total	8,057,550	6,271,573	14,329,123	4,067,823.06	.28388

The following tables show monthly output of all dredges, exclusive of sand and gravel plants:

TABLE 1.—*Yardage removed, first district, Pedro Miguel Locks to sea.*

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1914.							
July	20,682	7,997	28,679	287,689	23,378	311,067	339,746
August	35,754	102,433	138,187	258,791	12,315	271,106	409,293
September	72,126	36,063	108,189	273,862	8,934	282,796	390,985
October	10,145	5,073	15,218	266,159	11,613	277,772	292,990
November	51,350	10,594	61,914	287,679	2,000	289,679	351,623
December	53,561	21,644	75,205	328,308	3,328	331,636	406,841
1915.							
January	21,674	10,837	32,511	278,120	8,622	286,742	319,253
February	1,752	5,251	7,003	193,053	7,763	200,816	207,819
March	5,180	7,959	13,139	184,687	3,297	187,984	201,123
April	23,156	5,201	28,357	153,853	6,944	160,797	189,154
May	52,318	6,716	59,034	121,620	4,162	125,782	184,816
June	16,277	7,761	24,038	132,079	5,764	137,843	161,881
Total	363,975	227,529	591,504	2,765,900	98,120	2,864,020	3,455,524

TABLE 2.—*Yardage removed, first district (Gaillard Cut), Pedro Miguel Locks to Gamboa Dike.*

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1914.							
July	47,997	383,637	431,634	....	....	....	431,634
August	76,970	346,588	423,558	....	....	....	423,558
September	43,620	332,557	376,177	....	....	....	376,177
October	97,224	446,470	543,694	....	....	....	543,694
November	103,510	387,607	491,117	....	....	....	491,117
December	85,680	427,241	512,921	....	....	....	512,921
1915.							
January	109,840	494,347	604,187	....	....	....	604,187
February	113,728	475,435	589,163	....	....	....	589,163
March	111,960	558,931	670,891	....	....	....	670,891
April	68,906	566,811	635,717	....	....	....	635,717
May	119,425	551,724	671,149	300	....	300	671,449
June	132,936	588,039	720,975	....	....	....	720,975
Total	1,111,796	5,559,387	6,671,183	300	....	300	6,671,483

TABLE 3.—*Yardage removed, second district.*

Month and year.	Canal prism.			Auxiliary.			Grand total.
	Earth.	Rock.	Total.	Earth.	Rock.	Total.	
1914.							
July	57,678	....	57,678	188,142	35,248	223,390	281,068
August	179,506	....	179,506	164,248	17,995	182,243	361,749
September	55,621	....	55,621	303,340	33,947	337,287	392,908
October	....	....	....	442,508	42,083	484,591	484,591
November	13,424	....	13,424	256,569	30,039	286,608	300,032
December	118,800	....	118,800	138,811	20,891	159,702	278,502
1915.							
January	151,200	....	151,200	95,210	19,853	115,063	266,263
February	238,264	....	238,264	45,556	23,656	69,212	307,476
March	199,521	....	199,521	172,039	35,887	207,926	407,447
April	30,561	....	30,561	155,560	32,885	188,445	219,006
May	....	....	....	144,204	31,048	175,252	175,252
June	....	....	....	142,056	63,005	205,061	205,061
Total	1,044,575	....	1,044,575	2,248,243	386,537	2,634,780	3,679,355

On July 1, 1915, there remained to be removed from the canal prism, including siltage, slides, and original material, 5,529,000 cubic yards of earth and 11,906,000 cubic yards of rock. These quantities include 750,000 cubic yards of earth at the Pacific and 1,000,000 cubic yards of earth at the Atlantic entrances, estimated to cover silting of the channel for the year July, 1915, to June, 1916; 9,786,900 cubic yards of rock in slides, either moving toward or within the canal prism in Gaillard Cut.

The following table shows the number of days dredges were retired for repairs and renewals:

Dredges.	Type.	Time out of service.	Remarks.
		Days.	
Culebra	Sea-going suction dredge	280	Retired from service part of year.
Caribbean	do	83	Do.
No. 4	Pipe-line suction dredge	54	
No. 82	do	7	
No. 83	do	27	
No. 84	do	53	
No. 85	do	35	
No. 86	do	37	
Gamboa	15-yard dipper dredge	20	
Paraiso	do	17	
Cardenas	5-yard dipper dredge	84	Only two of these dredges are kept in commission at the same time.
Chagres	do	71	
Mindi	do	89	
Corozal	Seagoing ladder dredge	41	
No. 1	French ladder dredge	3	
No. 5	do	10	
Badger	do	334	Retired from service.
Gopher	French ladder dredge (marine)	42	
Marmot	French ladder dredge	12	

SUBAQUEOUS ROCK EXCAVATION.

FIRST DISTRICT, GAMBOA DIKE TO PANAMA BAY.

Of hard and soft rock 5,786,916 cubic yards were removed from the canal prism during the year, 227,529 cubic yards from the Pacific entrance, and 5,559,387 cubic yards from Gaillard Cut. Of this amount 719 cubic yards were drilled and blasted by the drill barge *Teredo;* 42,913 cubic yards by the drill barge *Teredo 2;* 4,880 cubic yards by tripod drills; and 52,731 cubic yards were broken by the rock breaker *Vulcan.* The remainder includes rock which had been drilled and blasted by well drills in previous years and material which could be handled by dredges without mining. On this work and for dobying 294,106 pounds of dynamite were used during the year.

The following table shows the location, method of breaking, and area covered, of the rock shoals worked, and monthly statement of rock removed by dredges:

Month and year.	Station and method of breaking.		Area covered.	Amount dredged.
	Teredo.	Vulcan.		
1914.			*Square feet.*	*Cubic yards.*
July	Cucaracha slide 1808+50; 1814+00 E.	2115 E, 2210 W	58,600	415,012
August	Out of commission	2115 E, 2185 E	24,320	461,336
September	do	2115, 2185, 2195 E	67,696	377,554

Month and year.	Station and method of breaking.		Area covered.	Amount dredged.
	Teredo.	Vulcan.		
			Square feet.	*Cubic yards.*
1914.				
October	Out of commission	2115 E, slip No. 1, Balboa inner harbor.	53,040	463,156
November	Cucaracha slide; 1814+00 E	Slip No. 1, Balboa inner harbor; 1805 Cucaracha slide.	51,306	400,201
December	do	1805 E and W, Cucaracha slide.	101,908	452,213
1915.				
January	2183 Pacific entrance; 1814 Cucaracha slide.	1807 E and W, Cucaracha slide; 2225 W, Pacific entrance.	101,483	513,806
February	2126, 2133, 2134, 2182, 2183 E	2225 W, Pacific entrance; 1808 W, Cucaracha slide.	90,127	488,449
March	2120, 2125, 2126 E	1808 W, Cucaracha slide	74,698	570,187
April	2119, 2120, E, Pacific entrance; 1803, 1806, 1808 Cucaracha; 1795 E, Culebra slide.	Out of commission	7,150	578,956
May	2118 E, Pacific entrance; 1809, 1810 E, Cucaracha slide; 1790, 1791, 1792, Culebra slide.	do	4,775	562,602
June	1805, 1809, 1810, 1815 Cucaracha; 1780, 1792, 1793 Culebra slide.	Slip No. 1, Balboa inner harbor.	23,719	601,564
Total			658,822	5,885,036

SECOND DISTRICT.

No rock was mined or removed from the canal prism during the year. One thousand six hundred and fifty pounds of dynamite were used for dobying at the Cristobal coaling station.

DREDGING OPERATIONS.

FIRST DISTRICT.

Dredges were at work throughout the year deepening and maintaining the canal channel at the Pacific entrance, Miraflores Lake, and Gaillard Cut, excavating a total of 7,262,687 cubic yards, as shown in the following table:

	Excavation.		
	Construction yardage.	Maintenance yardage.	Total.
	Cubic yards.	*Cubic yards.*	*Cubic yards.*
Pacific entrance	498,400	43,612	542,012
Miraflores Lake	40,830	8,662	49,492
Gaillard Cut	1,960,617	4,710,566	6,671,183
Total canal prism, first district	2,499,847	4,762,840	7,262,687

Of the material removed from Gaillard Cut 29 per cent was from Cucaracha slide, 66 per cent from Culebra slide, and 5 per cent from all other slides and areas.

The following table shows the distribution of the material removed from Gaillard Cut:

Location.	Fiscal year.			Total to date.		
	Earth.	Rock.	Total.	Earth.	Rock.	Total.
	Cu. yds.	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*	*Cu. yds.*
Gamboa Dike	....	5,736	5,736	23,856	53,105	76,961
La Pita slide	....	24,733	24,733	....	24,733	24,733
Empire	....	2,415	2,415	3,221	115,516	118,737
Culebra slide (old)	[1] 886	266,459	267,345	28,449	1,061,337	1,089,786
Culebra slide (new)	[2] 566,013	3,559,897	4,125,910	566,013	3,559,897	4,125,910
Cucaracha slide	260,983	1,668,168	1,929,151	1,125,998	3,225,528	4,351,526
65-foot berm	....	25,730	25,730	....	25,730	25,730
Miscellaneous	[3] 275,127	15,036	290,163	275,127	15,036	290,163
Total	1,103,009	5,568,174	6,671,183	2,022,664	8,080,882	10,103,546

[1] Prior to Oct. 14, 1914. [2] Since Oct. 14, 1914. [3] Small slides and fills in the canal.

Cucaracha slide was very active from July to October, quiet during the dry season and active again with the beginning of the rainy season in April.

Culebra slide, east, has been very active since October 14, 1914, during which time over 4,500,000 cubic yards of material have moved into the canal and approximately 4,000,000 cubic yards additional in motion.

Culebra slide, west, showed little activity throughout the greater part of the year, but in June, 1915, a general movement of the bank from stations 1771 to 1796 was noticeable, and it was estimated that 5,000,000 cubic yards of material were in motion on June 30, 1915.

NOTE.—This estimate based on a uniform slope to the canal prism from the farthest cracks, on an approximate 3 feet horizontal to 1 foot vertical slope.

Surveys of the canal in the vicinity of the active slides were made daily, the channel dragged and marked with buoys for the passage of shipping. At times the channel shoaled so rapidly that it was necessary to drag after the passage of each ship. At times such shoals required dredging before following ships could proceed.

All material removed from the Cut by ladder, dipper, and self-propelling suction dredges was dumped in Gatun Lake, from Gorgona to San Pablo. Material removed by pipe-line dredge was deposited on dump in the Rio Grande Valley with the assistance of a 20-inch relay pump.

Navigation suspended on account of slides October 14 to 20, 1914, October 31 to November 4, 1914, and March 4 to 10, 1915.

Output of dredges was greatly reduced because of necessary daily channel clean-up for the passage of shipping.

SECOND DISTRICT.

Dredges were engaged during the year deepening and maintaining the canal channel at the Atlantic entrance; 1,044,575 cubic yards of material were removed. Of this amount 12,514 cubic yards were chargeable to construction work and 1,032,061 cubic yards to canal maintenance.

No dredging was done in the Gatun Lake section (Gatun Locks to Gamboa Bridge).

Material excavated in the second district was dumped on Mindi Island, Cristobal Mole, east breakwater, and at sea.

MISCELLANEOUS DREDGING.

PACIFIC TERMINALS.

From the Balboa Inner Harbor 2,718,406 cubic yards of earth and 93,686 cubic yards of rock were removed by pipe-line and ladder dredges. The soft material underneath Pier 18 and the unloader wharf was sluiced out by dredge *No. 85* and the hydraulic grader. Material removed by pipe-line dredges was used in reclaiming the swamp areas north of Balboa and in the San Miguel section of Panama City; that removed by ladder dredges was towed to sea and dumped.

To maintain depths at berths along the Panama Railroad wharf at Balboa 14,128 cubic yards of earth and 4,434 cubic yards of rock were removed.

To prepare berth for tank ships at the Balboa oil dock 33,366 cubic yards of earth were removed.

ATLANTIC TERMINALS.

From the Cristobal approach channel 709,240 cubic yards of earth and 50,006 cubic yards of rock were removed; 201,240 cubic yards of earth from opposite piers Nos. 11, 13, 14, Cristobal Harbor; 113,659 cubic yards of earth from the turning basin at the entrance to the old coal dock slip; 21,074 cubic yards of earth from the coal dock slip and 5,116 cubic yards of rock at the west end of Pier No. 10.

From the submerged storage basin 132,867 cubic yards of coral rock were removed; 2,129 cubic yards of coral rock from the east berth; 35,711 cubic yards of coral rock from the west berth, and 132,167 cubic yards of coral rock from the berth and turning basin north of the Cristobal Coaling Station. In the government and private storage areas to elevation +2.0 feet 62,668 cubic yards of fill were placed; 26,846 cubic yards of fill placed under the east and 2,086 cubic yards of fill under the west concrete docks inclosing the submerged storage basin.

Around the substation building at Cristobal 6,650 cubic yards of fill were placed.

FORTIFICATION RESERVE.

In fills on the fortification reserve at Toro Point 477,898 cubic yards of material were placed and 407,724 cubic yards at Margarita Island.

EAST BREAKWATER.

In the core of the east breakwater at Coco Solo 252,319 cubic yards of coral sand and fingers were placed; 26,016 cubic yards of coral rock removed from Coco Solo Harbor; 5,074 cubic yards of fill placed in the pile yard; 23,057 cubic yards of fill in the relay station foundations; 35,758 cubic yards of sand and 200 cubic yards of rock fill in dikes.

The core of the breakwater was filled by running the dredge discharge line down the center of the breakwater trestle and discharging overboard. The greater length of discharge line used was 12,150 feet with one relay 4,200 feet from the dredge. Two northers, February 8–10 and April 4, 1915, were experienced. The norther of February 8–10, carried away a large part of the trestle, 13,200 feet of discharge pipe, and the relay pump house; also damaging the motors and pump.

SAND AND GRAVEL PRODUCTION.

The sand and gravel necessary for construction purposes was excavated by dredges at the Chame sand pit and Chagres River gravel beds, transported in barges to the unloading docks at Balboa and Gamboa, for delivery to the various divisions and outside companies.

The dredge *Gopher* operated in the Chame sand pit from July 1 to October 20, 1914, after which date all sand was supplied from the Chagres River beds. Sixty-seven thousand and seventy-five cubic yards were dredged and delivered to storage piles.

Ladder dredge *No. 1* and pipe-line dredge *No. 82* were operated in the Chagres River sand and gravel service, delivering 455,686 cubic yards of material to the Gamboa handling plant.

Suction dredge *No. 82* was placed in the gravel service because of the demand for sand and screened gravel, it not being practicable to operate the screening plant with ladder-type dredge. Owing to the heavy repairs made necessary to the suction dredge, from the wearing of pumps and pipe lines, it was found to be more economical to retain both the ladder and suction dredges in the service, operating with single crews, the ladder dredge excavating run-of-bank and the suction dredge handling gravel to be screened.

The screen used was of the revolving cylindrical type, 9 by 14 feet, inside plates 2 inches and outside three-eighths-inch mesh, mounted on a barge provided with the necessary chutes for loading barges and delivering sand, and Nos. 1, 2, and 3 gravel.

No. 1 gravel was passed over the 2-inch screen, No. 2 through the 2-inch screen, No. 3 over the three-eighths-inch screen, and sand through the three-eighths-inch screen.

OBISPO DIVERSION.

The Obispo diversion, which carried all the drainage water east of the canal and between the Continental Divide and the Chagres River, was located very near and parallel to the canal from south of Empire to opposite Buena Vista. Where the diversion channel crossed valleys, large earth and rock dikes had been built forming lakes of considerable extent and in some cases 26 feet deep. The elevation of the water in the channel and lakes averaged 90 feet higher than mean water level in the canal and as a result the east bank of the canal was continually saturated with water, causing numerous slips and slides. These lakes and the channel between were drained into the canal by excavating a series of six ditches, one to each lake. The material was removed by hand, crane with clamshell bucket, and by sluicing with the hydraulic grader. A total of 21,700 cubic yards was excavated.

HYDRAULIC FILL NEAR PANAMA.

A gang of men was engaged in digging drainage ditches through the hydraulic fill on the reclaimed swamp lands at San Miguel and north of the Balboa Railroad station, from June 18 to 30, 1915.

DAILY REPORTS ON SLIDES.

A daily inspection and report on the slide conditions at east and west Culebra slides was made from December 18, 1914, to June 30, 1915. A continuous record of the horizontal and vertical movements kept, all new cracks and breaks located, noted, and reported.

MINDI DIKES.

Three permanent rock dikes to replace the temporary dikes were constructed on the south shore of Limon Bay. Work was started in October, 1914, and completed in March, 1915. Dike A is 705 feet long, 800 feet west and parallel to the canal axis; B, 460 feet long and 1,300 feet west of the canal; C, 270 feet long and 1,800 feet west of the canal with a top width of 5 feet and elevation plus 2 feet M. S. L., side slopes of $1\frac{1}{2}$ to 1.

The rock was loaded into barges in Gaillard Cut, towed to the side of the dikes, reloaded into pan cars which were run out on the dikes and dumped. Seven thousand two hundred and forty-two cubic yards of rock were used on this work. The norther of February 8–10, 1915, caused some settlement of the dikes and they had to be recrowned, but no settlement was noticeable after the norther of April 4, 1915.

Timber groins, for protection of the beach, were built at intervals of 400 feet from Dike C, around the south shore of Limon Bay, to a point near Kinney's Bluff, also between the rock dikes and between Dike A and the canal, a total of 34 in all. Groins are perpendicular to the beach, 90 to 100 feet long, constructed of 6 by 6 inch posts driven on 6 feet centers and planked on both sides from one-half foot below to 2 feet above ground line, and extend from above wash line to beyond low-water line.

WATER HYACINTHS.

The destruction of water hyacinths in the canal, Gatun Lake and its tributaries, was continued throughout the year. The outfit used and methods employed were the same as described in the annual report for 1914.

One hundred and thirty-five thousand square yards of old hyacinths were killed by poisoning and about 600,000 young plants pulled up and deposited on shore. Very few old plants are now to be found and practically none have been allowed to seed since January, 1915, though the waters of the lake from Gamboa to Bohio and the Chagres Valley had been so thoroughly seeded prior to this, that it requires constant inspection, and a force of men to pull the young plants before they have had time to seed.

An inspection of the waters of Gatun Lake including the Chagres, Trinidad, Gatun, and Siri River Valleys and tributaries was made. No hyacinths were found in the lake north of Bohio or in the Trinidad, Siri, and Gatun River Valleys, although the upper reaches of these valleys are so badly choked with standing trees, snags, and drift, that a complete inspection was impossible.

The water hyacinth as found in the waters of Gatun Lake belongs to the family *Pontederiaceae* and is known technically as *Eichornia azurea*. This species is closely related to *Eichornia* (Piaropus) *crassipes*, the plant which is known in Florida and Louisiana as the water hyacinth.

The Isthmian species of plant is found in nearly all waters of the Atlantic slope, from Colombia to Costa Rica, especially the shallow lakes and more sluggish streams, and is commonly called "oreja de mula" (ear of the mule) or "buguelito" (little boat) by the natives.

During the year numerous tests and experiments have been made to determine as nearly as possible the habits and conditions under which the plant will grow.

The plant is propagated by stotons and seed, but principally from seed. The seed is very small and hard. After sprouting the young plant becomes attached to the bottom by numerous small threadlike roots. The character of the bottom is apparently immaterial, as they are found growing in either mud or rocky bottoms and in water 1 to 16 feet deep.

Young submerged plants have long narrow leaves, three-sixteenths of an inch wide by about 3½ inches long, at intervals of about one-eighth inch, on opposite sides of the stem and are very regular. When the plant reaches the surface of the water the leaves immediately change form and are 3 to 6 inches wide and 5 to 8 inches long, pointed at the outer end and tapering to the stem.

The stem below water, or root, is ropelike and very tough, above water the stem is thicker, tough, and very porous, and follows along the surface of the water sending out branches every 10 inches or so which in turn branch out and eventually form a thick mass or bed, bound together by many small matted roots 2 or 3 feet long which appear along the main stems as the plant grows. Beds of plants 6 months old will support a man on a 6-inch board.

The growth of the young plant while submerged is one-half to three-fourths inch per day, but upon reaching the surface it grows 2 to 3 inches a day. One plant, noted when 8 inches out of water, grew to be over 10 feet in length, had 11 branches and 2 stems of flowers in 54 days, covering an area of over 80 square feet.

The young plants are very tender and should not be pulled under three weeks or they are liable to break off below the water; this is especially so where the bottom is hard. If broken off the stem sends out from three to eight shoots, each of which grows to the surface and develops into full-grown plants.

A healthy plant will bloom in about six weeks from the time it appears above the surface, in eight weeks the bloom has died and seed pods formed. Each plant will produce two or more stems of 35 to 45 purple-colored flowers a month, or about 25 a year, a seed pod containing an average of 170 seeds forming at the base of each flower. Each healthy plant will therefore distribute about 170,000 seed each year. The seed ripens in four to six weeks' time and are very small; several pods of seed were counted with the aid of a glass.

Seeds planted in tubs under 10 inches of water sprouted and grew in 25 to 30 days; seed fully formed but not dry was planted but did not grow.

On dump No. 3, at Gamboa, several thousand square yards of old plants were killed in April, 1914. One year later, April, 1915, young plants appeared, grown from the seed deposited the year before in water 8 to 12 feet deep.

On May 19, 1915, about 2 cubic feet of mud was taken from an area where old hyacinths had been growing and deposited in a tank under 12 inches of water. On June 30, 42 days later, 32 young hyacinths had sprouted and were growing, some of which were 7 inches long.

From the distribution of the original beds of hyacinths it is thought that the parent plants which furnished the seed for these beds came on a flood or floods from the upper reaches of the Chagres River and were deposited in and around Gamboa while the lake was about elevation + 70, and were distributed from there on the rising water into the various shoals in this neighborhood. This belief is strengthened by the discovery of an old bed of plants in the Chilibre River near its junction with the Chagres.

The statement has been made that the plant here is not so prolific as the Florida and Louisiana variety, but the statement above made in regard to its seed development would seem to indicate that it is as able as the States plant in increasing and that the reason it has not spread all over the lake is that the current in the lake does not allow its distribution as a river does, and it is thought that this is the only reason that has allowed us to cope with it with a prospect of success.

Instances are known where an old bed has been destroyed and no new plants sprouted from the seed until six months or more had elapsed, when a good growth started, new plants constantly coming up from seed, to the present time.

Again old beds destroyed in shallow water in a very short time produced new plants from the seed, and in time these were pulled or destroyed, repeating the performance until the same area had been done over six or more times, and there is still a vigorous growth of young plants coming up.

The vigor and habits of the plant are such that it is thought it could not be exterminated over a sluggish moving stream unless with very great expense, dividing the stream into districts, beginning the campaign from the headwaters and working downstream. As each district was cleaned up it should be constantly patrolled, not to allow a single plant to go to seed, the side marshes and tributary streams treated the same way, and it is thought this campaign would require at least two or three years' time, as from our own experience it is known that some seeds deposited in deep water require a year or more to germinate.

The current is undoubtedly responsible for its distribution into other areas than that occupied by the parent plant, and when the plant can produce from 150,000 to 200,000 seed per year, be torn loose on a freshet, and travel the entire length of the stream to the sea, maturing and dropping its seeds the entire distance, it is no great wonder that it has not been conquered anywhere, so far as known.

On our part, it is thought that our campaign against it began in time and assisted as it has been by the lack of a distributing current will be entirely successful, although the total extermination of this plant, owing to the delay in germination of some of the seeds, will require a careful inspection for possibly a year or more longer.

SURVEYS.

The usual surveys were made of the dredged areas in the canal prism, Cristobal Harbor, Toro Point, Margarita, Coco Solo, Limon Bay, and Balboa Inner Harbor; cross sections plotted, reports and estimates prepared. The general progress surveys were made every four months.

Daily progress surveys were made of the channel at Cucaracha and Culebra slides; channel dragged and buoyed before passage of shipping.

Topographic surveys were made of the Cucaracha and Culebra slides and the Obispo diversion.

Office.

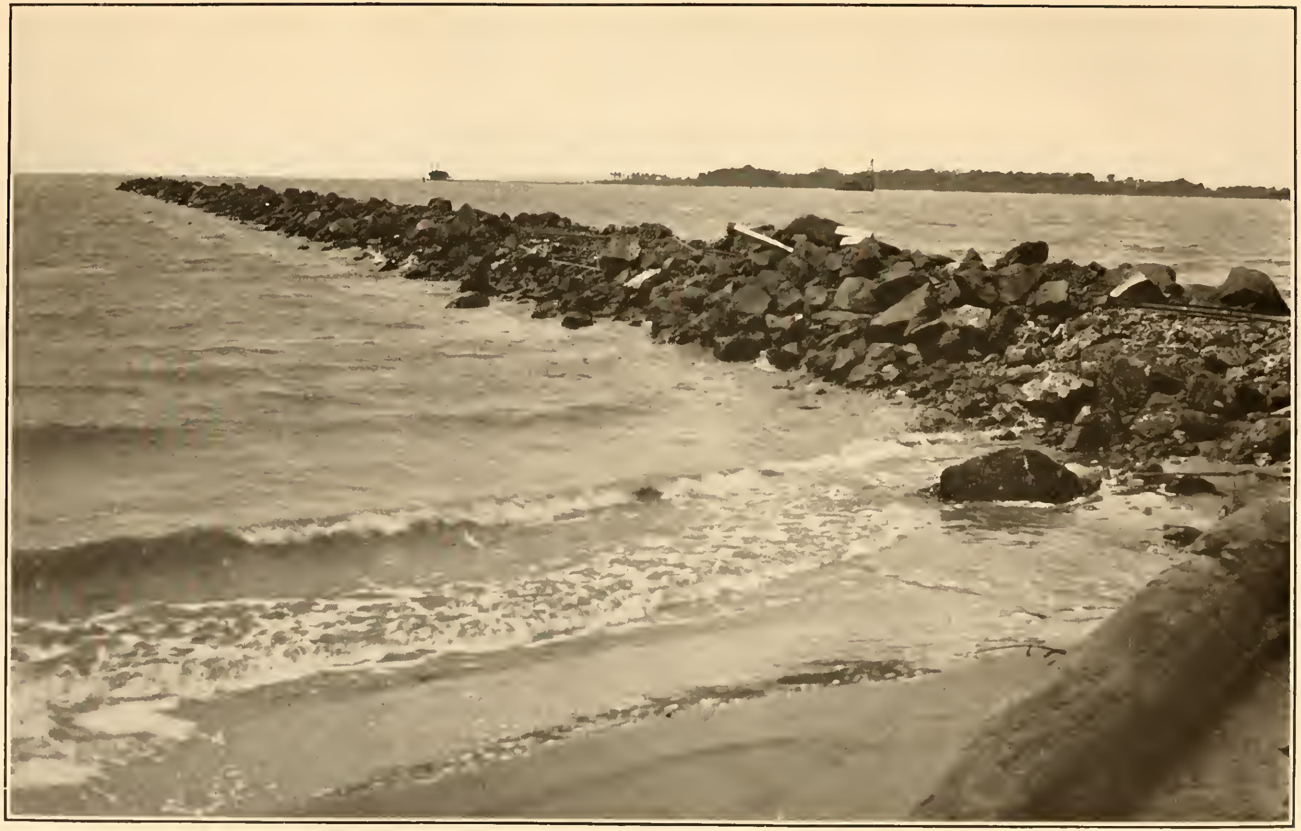
Routine clerical work, preparation of progress records, estimates, requisitions, etc., was satisfactorily performed during the year.

Respectfully submitted.

W. G. Comber,
Resident Engineer.

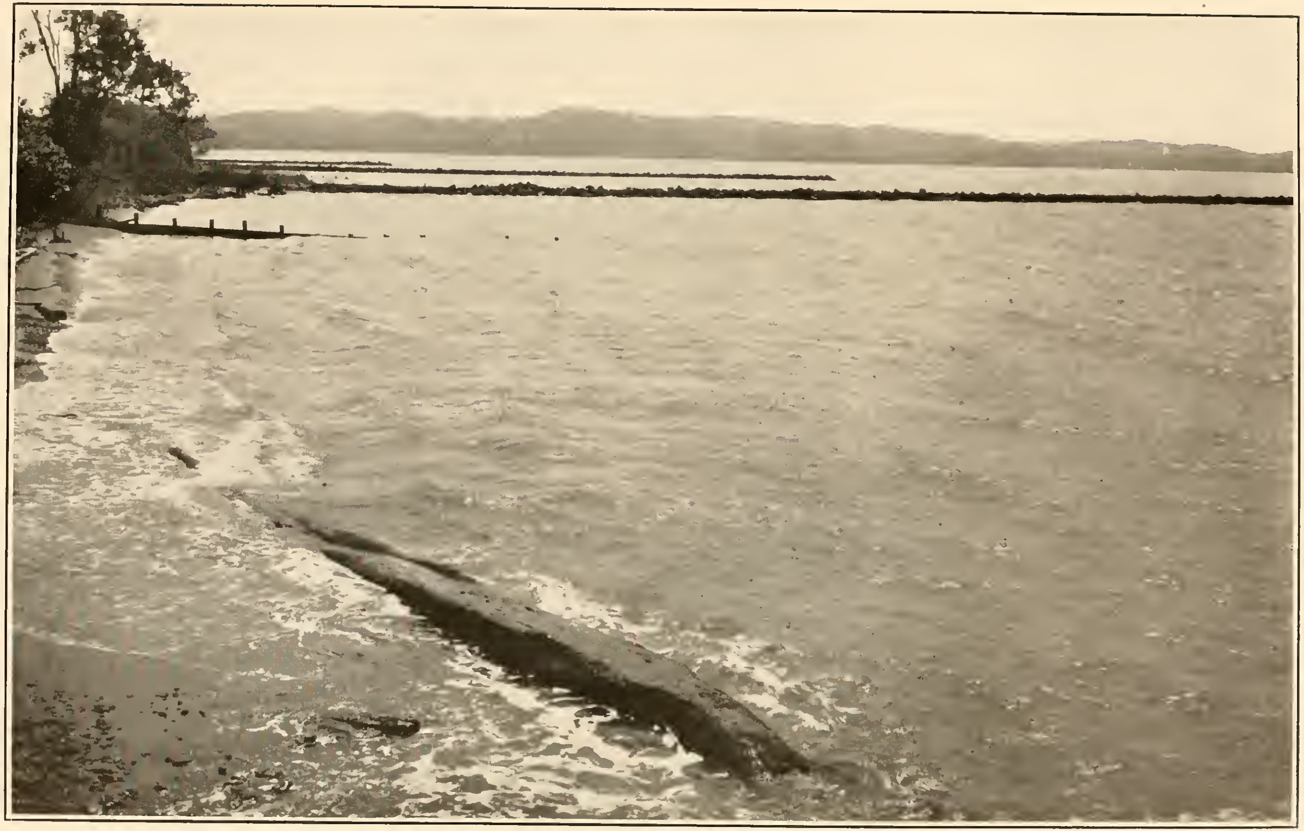
Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

PLATE 49.



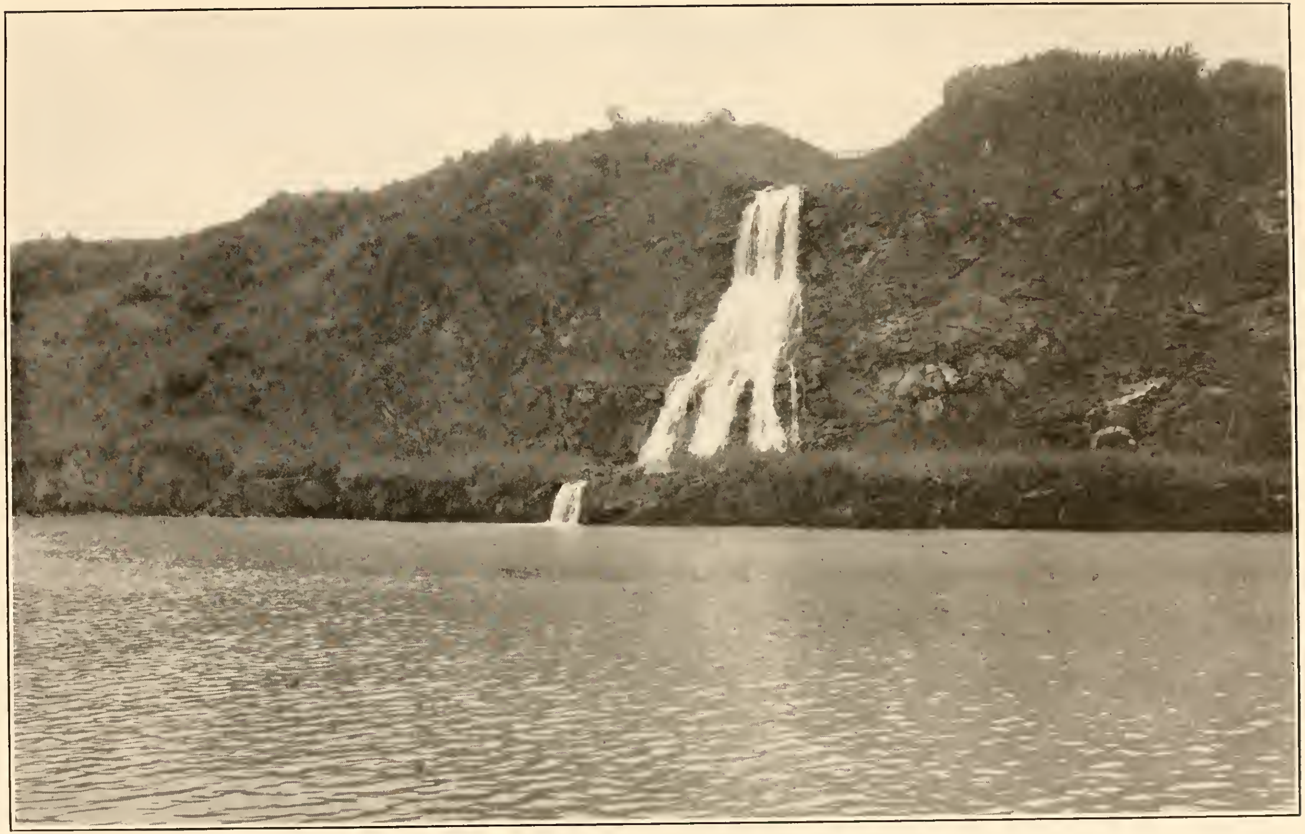
ROCK DIKES. LIMON BAY, DIKE NO. 1. JUNE, 1915.

PLATE 50.

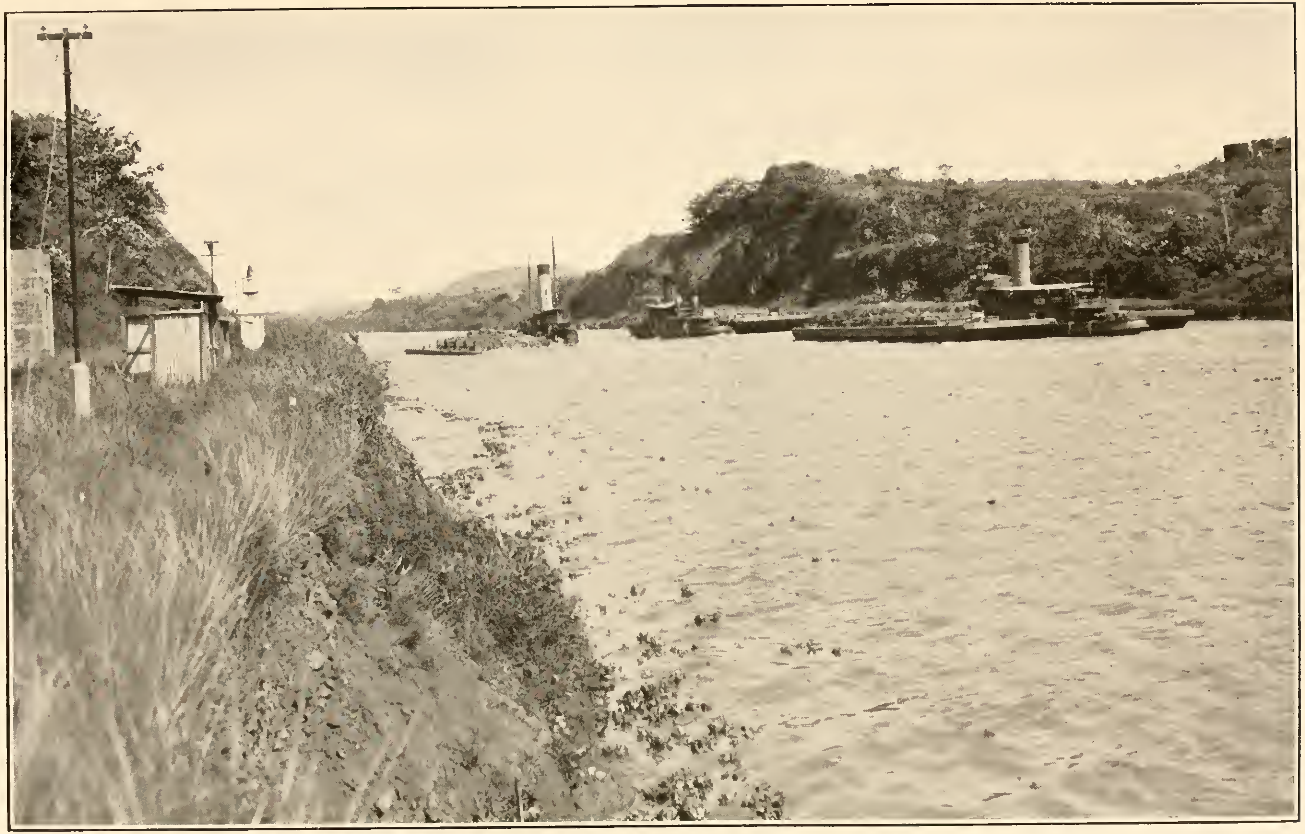


ROCK DIKES. LIMON BAY, DIKES NOS. 1, 2, AND 3 AND WOODEN GROINS, AT HIGH TIDE. JUNE, 1915.

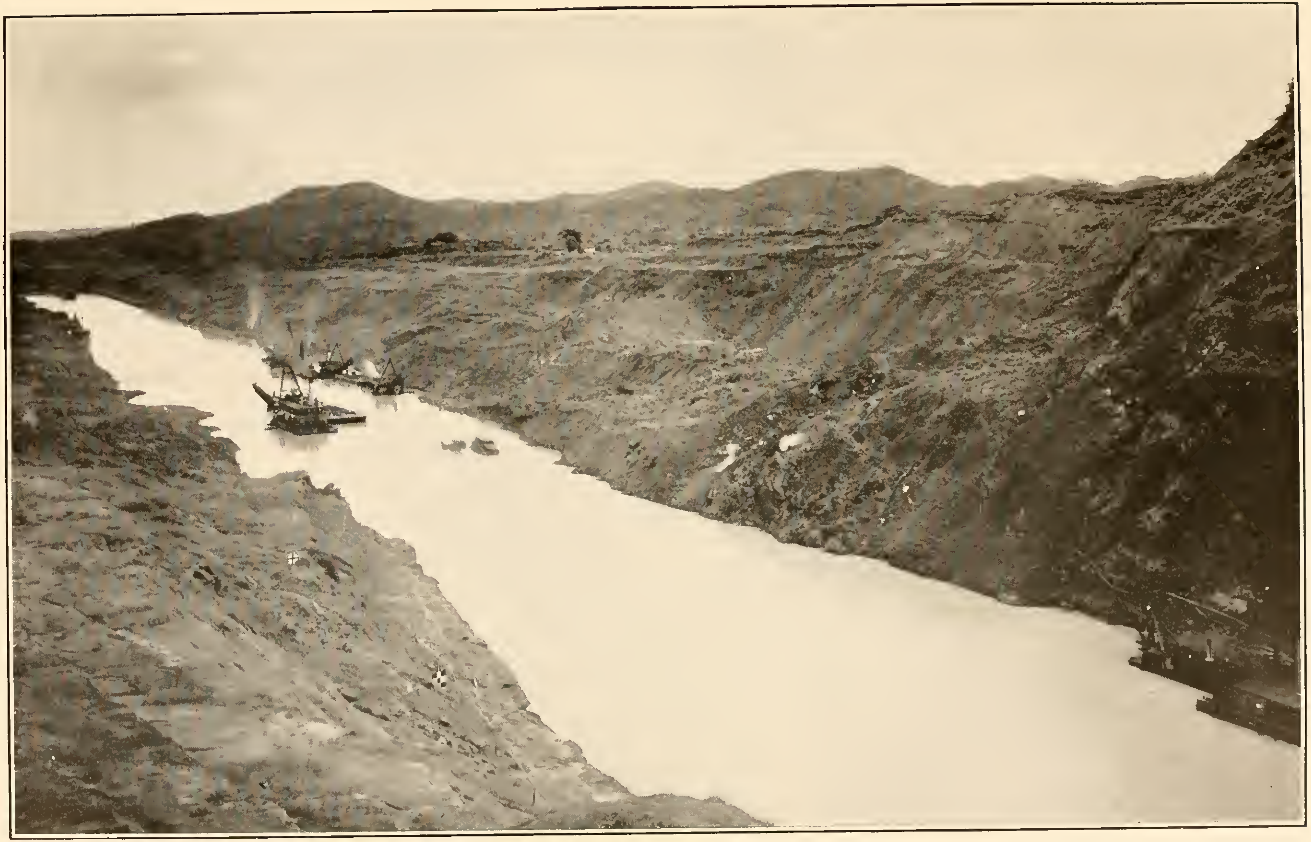
PLATE 51.



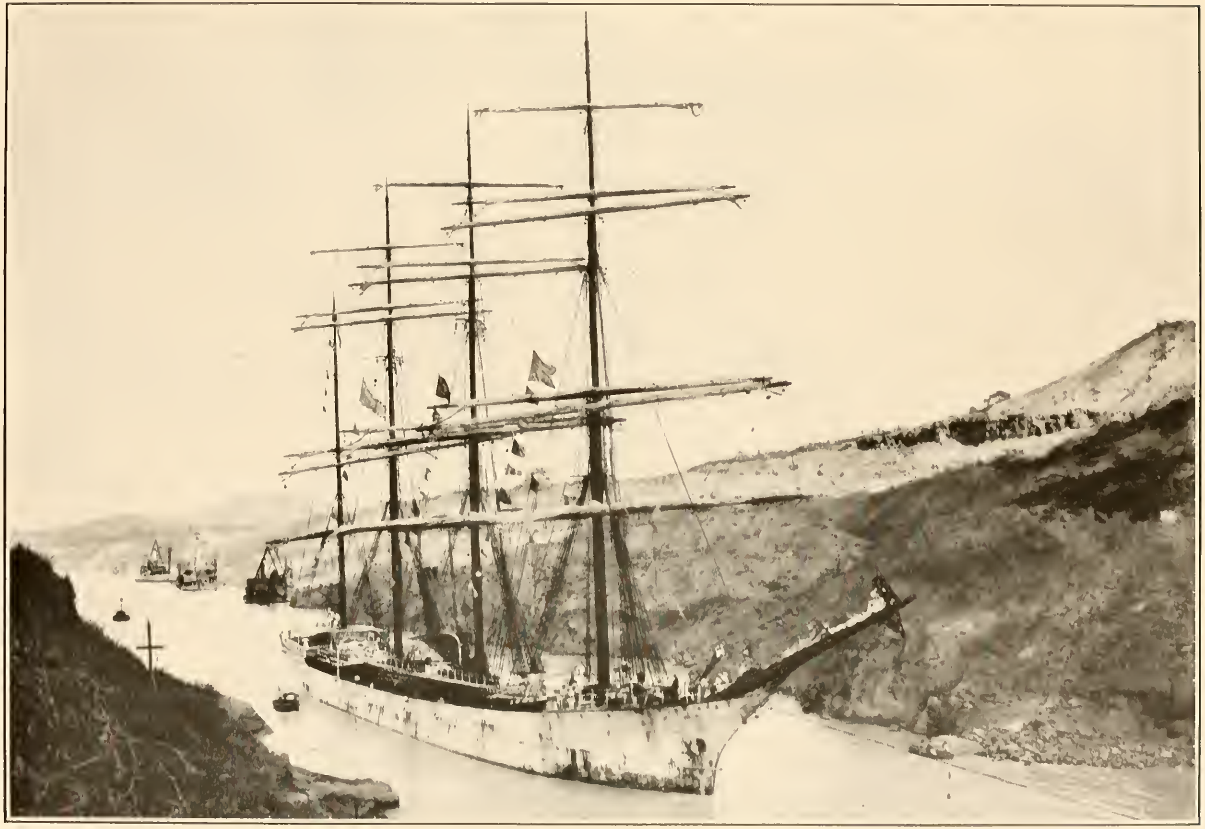
OBISPO DIVERSION DITCHES. OUTLET OF DITCH "A," OPPOSITE EMPIRE. JUNE, 1915.



GAILLARD CUT AT BAS OBISPO. LOOKING SOUTH FROM EAST BANK OF CANAL. JUNE 14, 1915.

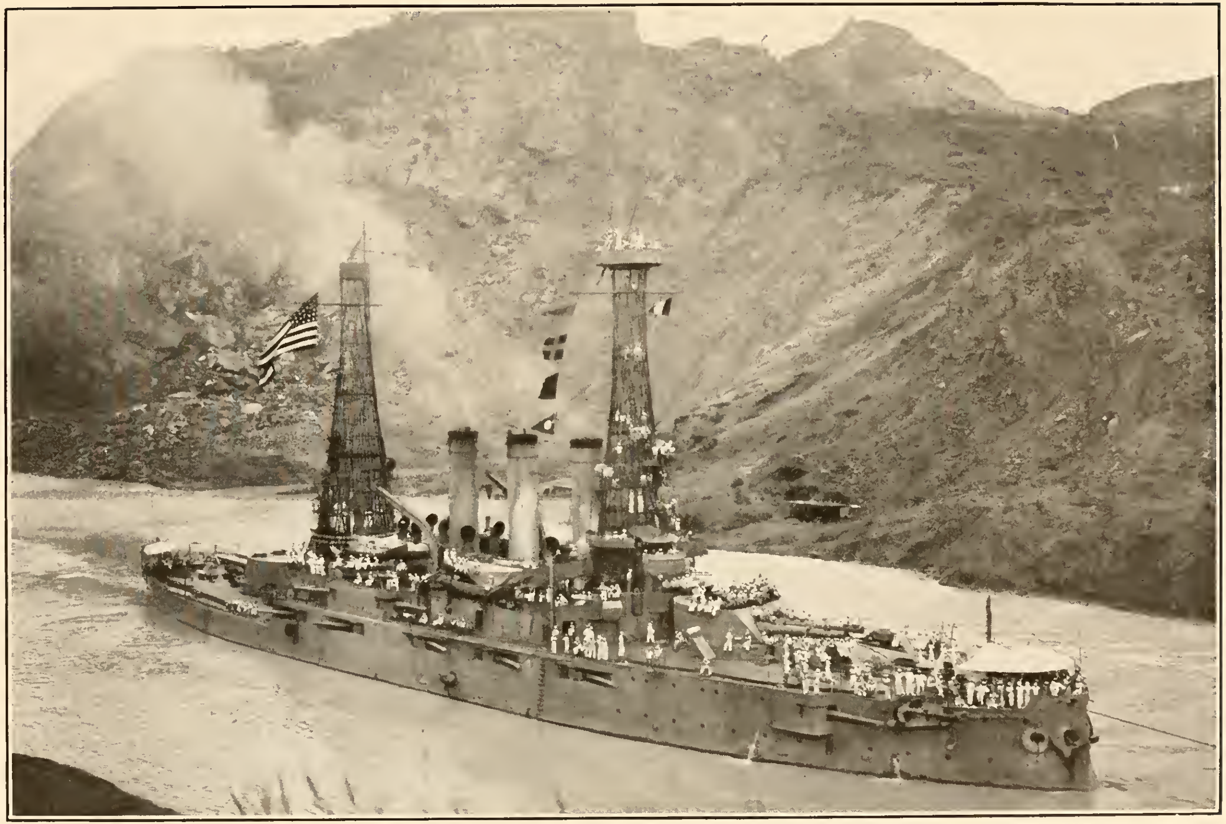


GAILLARD CUT. LOOKING NORTH FROM CONTRACTORS HILL. CULEBRA SLIDE EAST, RIGHT CENTER. JUNE, 1915.

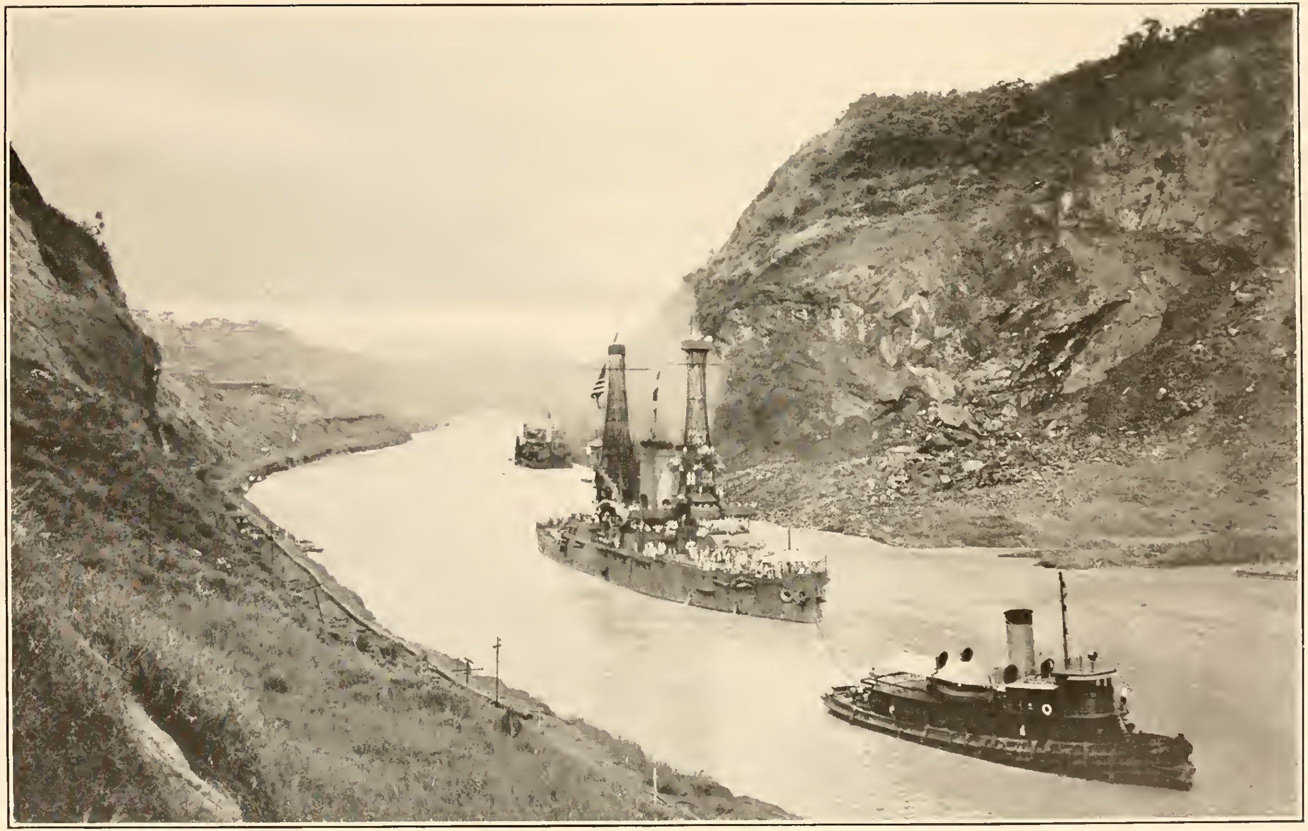


GAILLARD CUT. SAILING SHIP IN TOW PASSING SLIDE ON EAST BANK NORTH OF GOLD HILL. LOOKING NORTH. JANUARY 24, 1915.

PLATE 55.



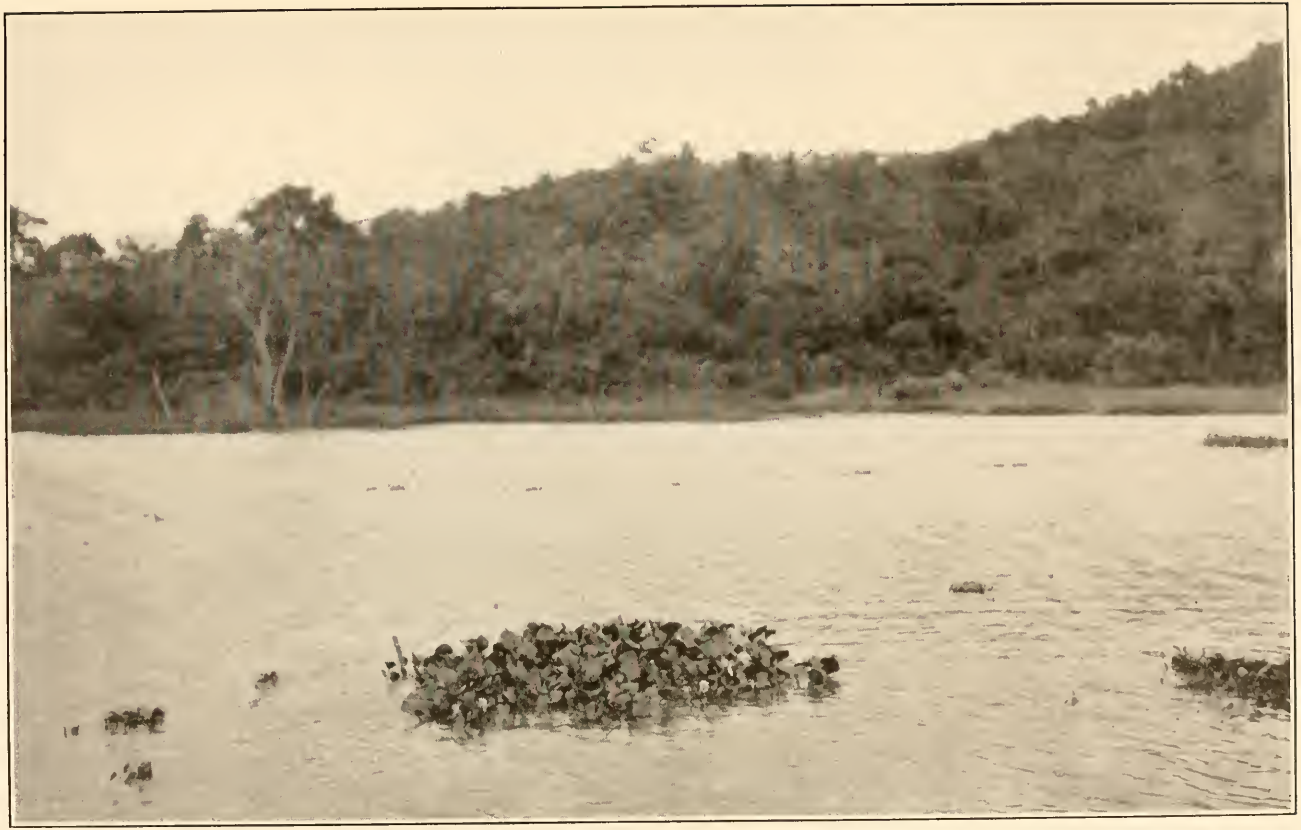
U. S. S. "OHIO" PASSING CUCARACHA SLIDE. LOOKING EAST. JULY 16, 1915.



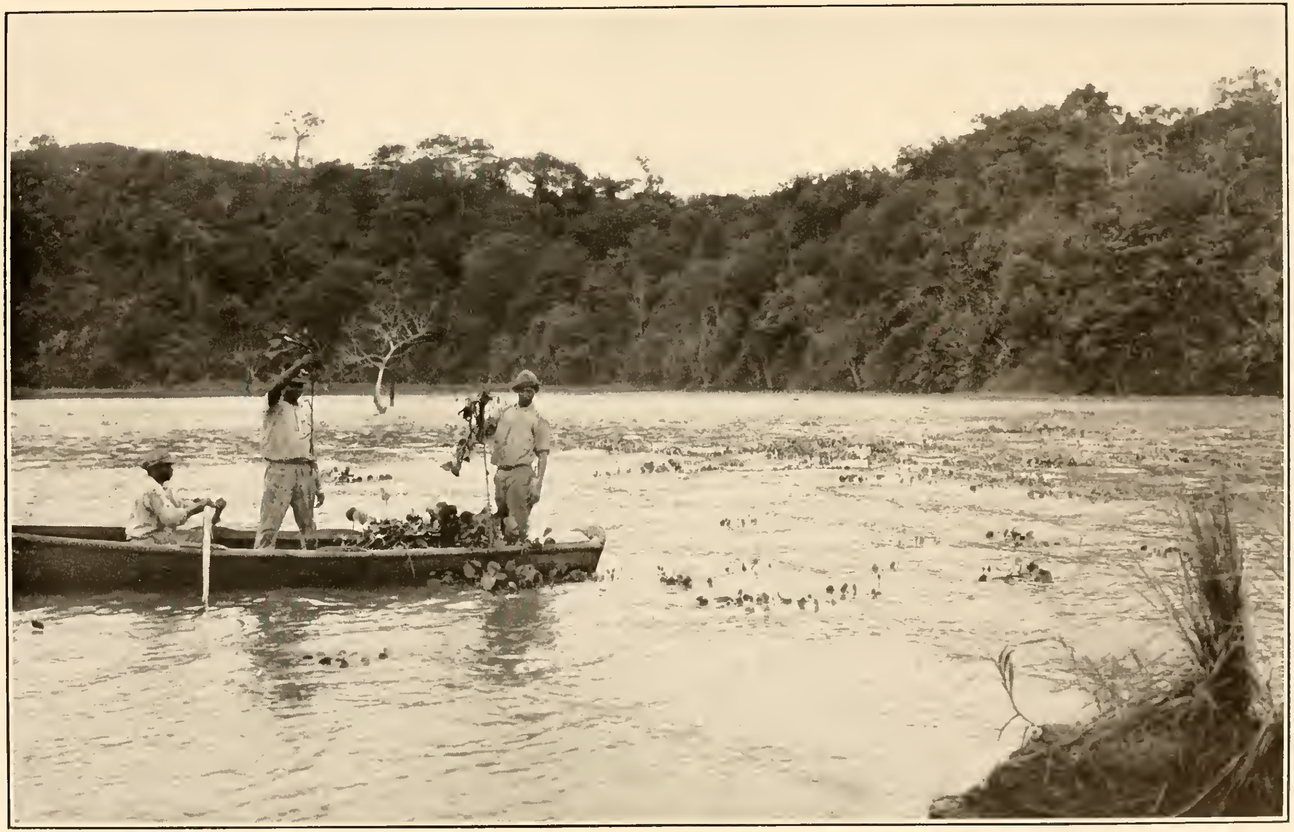
U. S. S. "OHIO" PASSING CUCARACHA SLIDE. JULY 16, 1915.

WATER HYACINTHS IN FULL BLOOM, EIGHT WEEKS OLD.

PLATE 58.

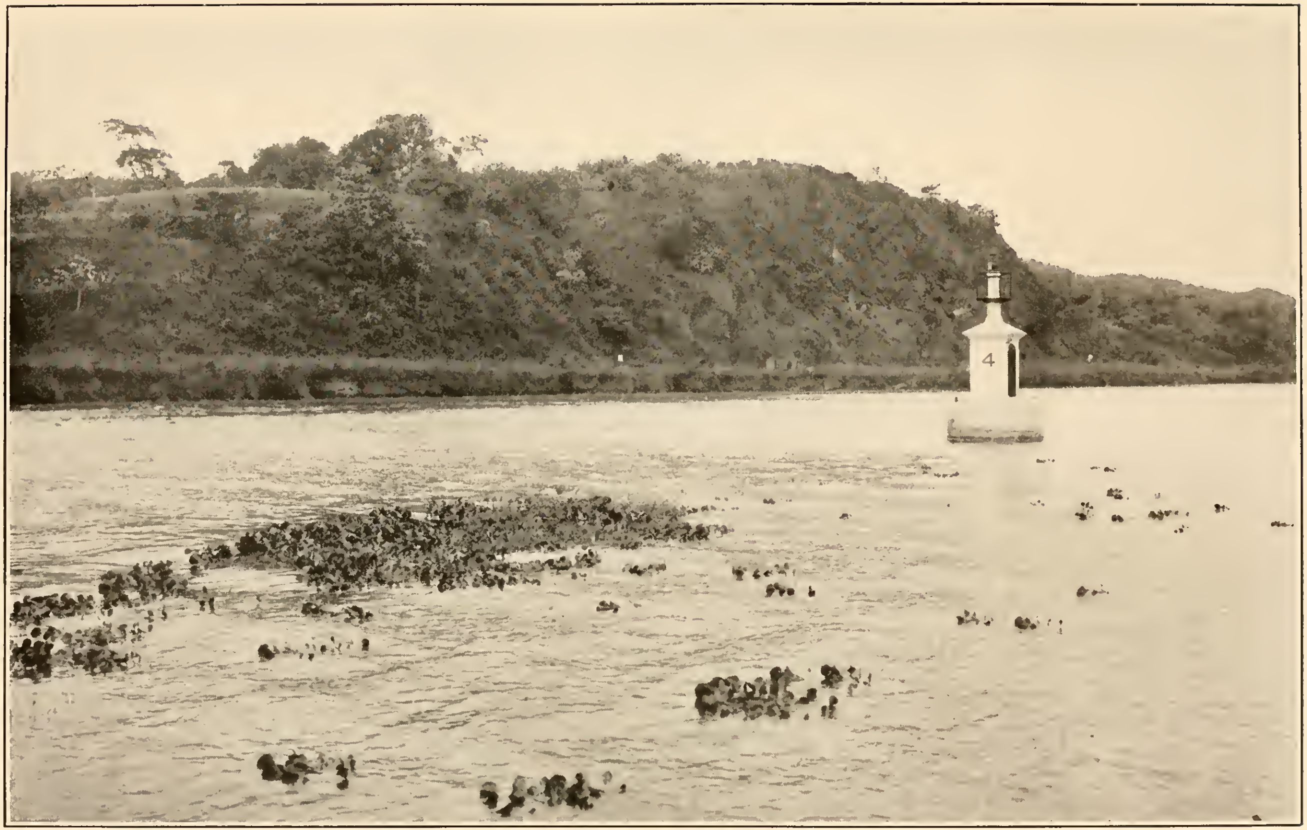


WATER HYACINTHS. A SINGLE PLANT EIGHT WEEKS AFTER IT APPEARED ABOVE THE WATER. JUNE, 1915.

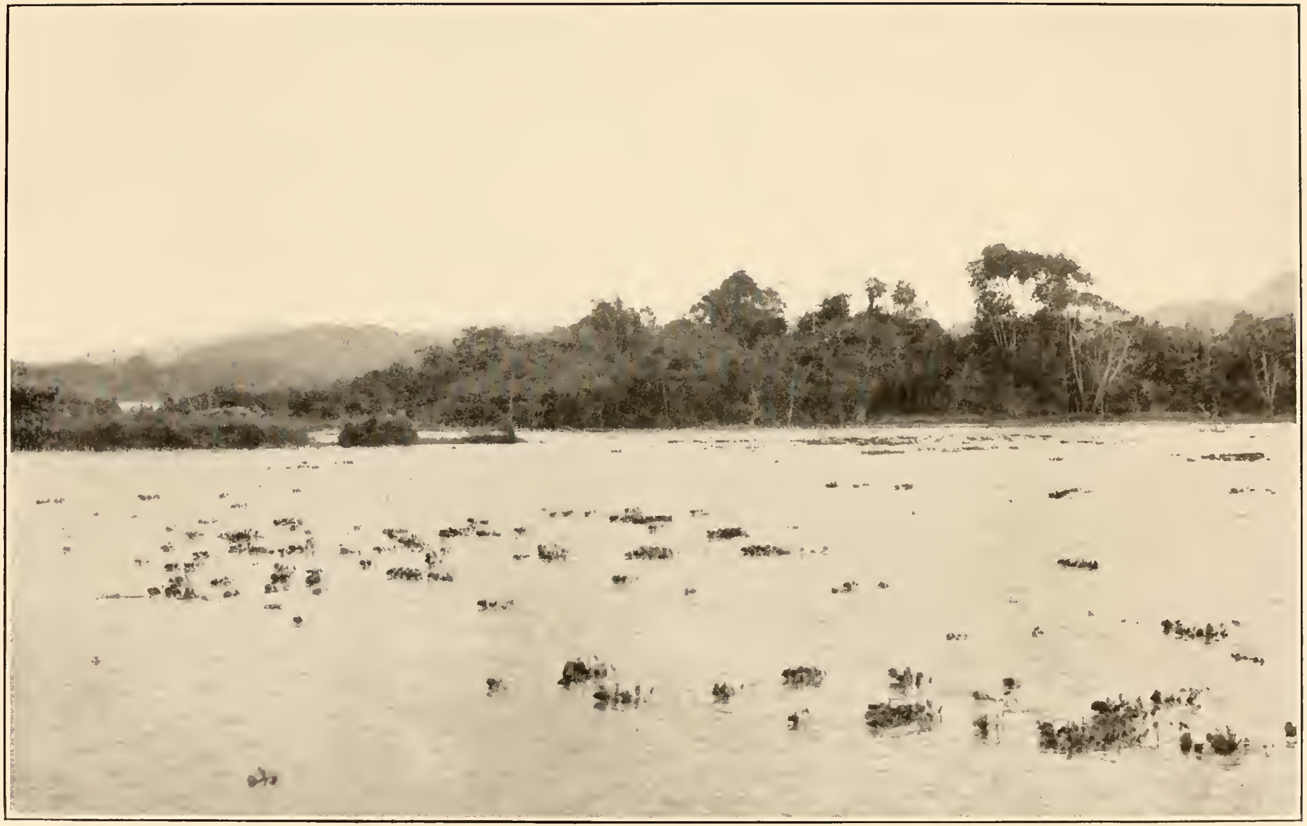


WATER HYACINTHS. REMOVING YOUNG PLANTS FROM THE OBISPO RIVER.

PLATE 60.

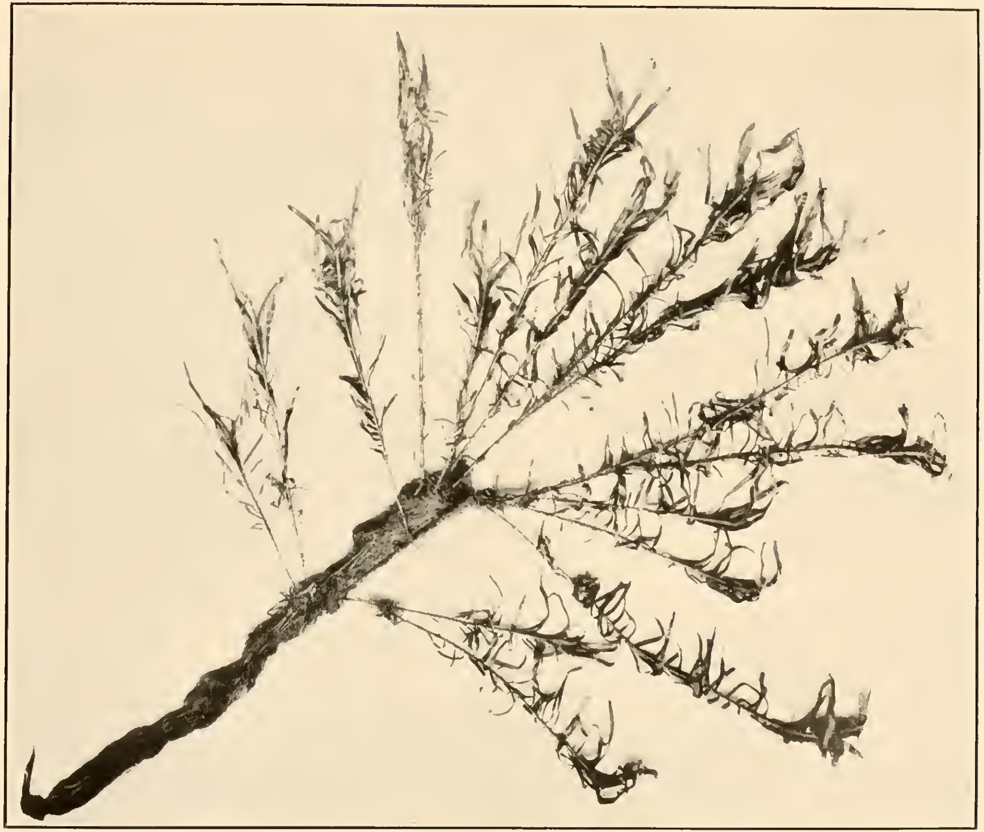


WATER HYACINTHS. PLANTS EIGHT WEEKS OLD NEAR THE MOUTH OF THE OBISPO RIVER.



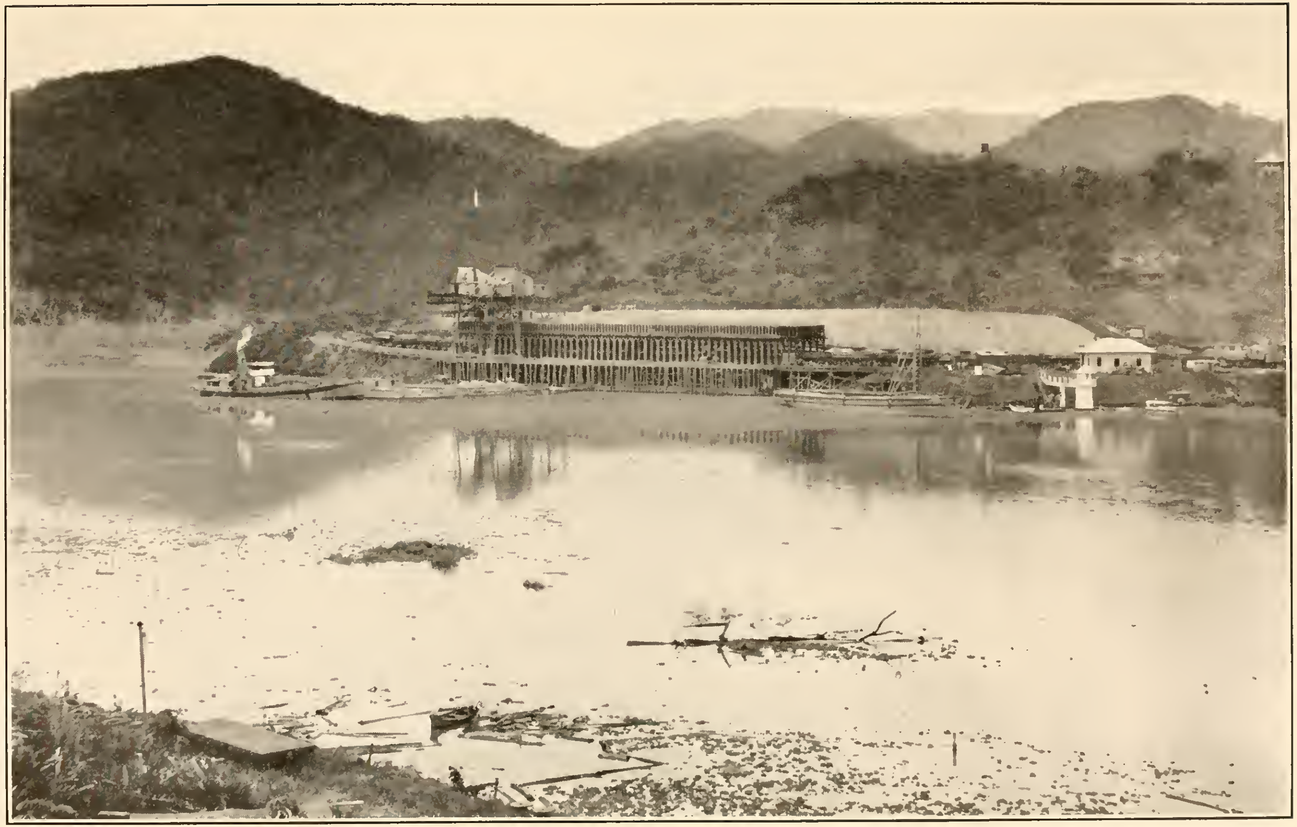
WATER HYACINTHS. PLANTS FOUR WEEKS OLD NEAR THE MOUTH OF THE OBISPO RIVER.

PLATE 62.



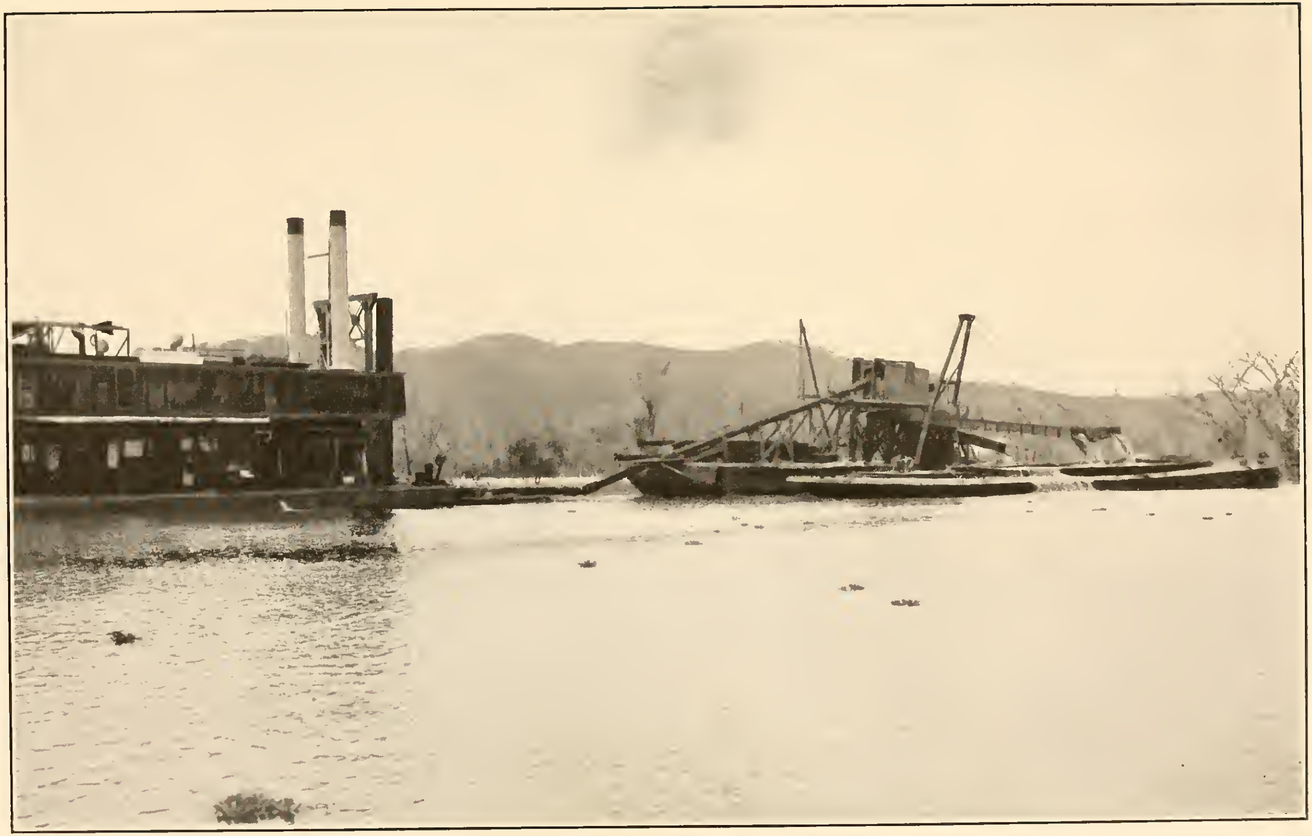
WATER HYACINTH.

PLATE 63.



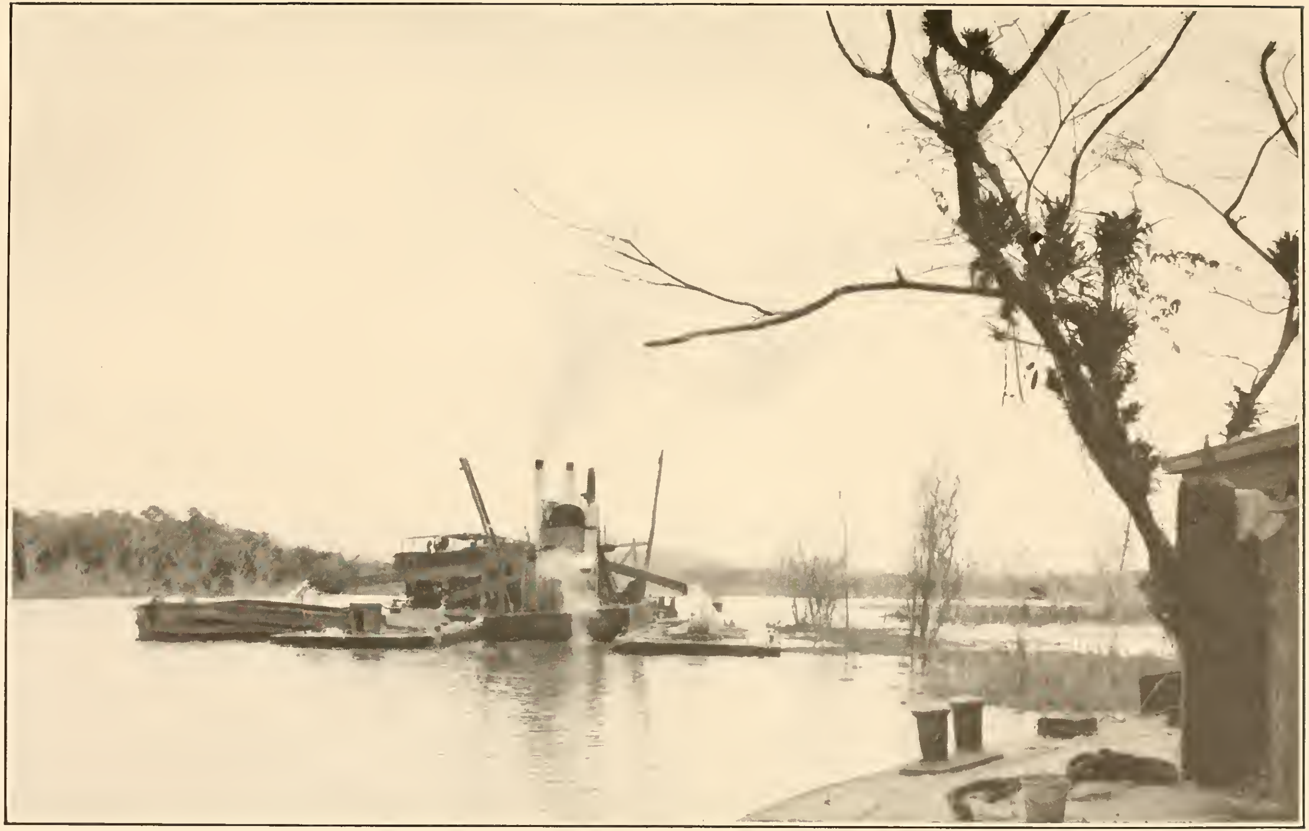
GAMBOA GRAVEL DOCK. UNLOADING CRANES AND STORAGE BINS. JUNE. 1915.

PLATE 64.



CHAGRES RIVER GRAVEL BEDS. PIPE LINE DREDGE IN OPERATION FOUR MILES ABOVE GAMBOA. JUNE, 1915.

PLATE 65.



CHAGRES RIVER GRAVEL BEDS. WASHING AND SCREENING PLANT IN OPERATION. FROM LEFT TO RIGHT BARGES BEING LOADED WITH SAND, NO. 1 GRAVEL, AND NO. 2 GRAVEL. JUNE, 1915.

APPENDIX D.

REPORT OF THE SUPERINTENDENT—MECHANICAL DIVISION.

Balboa, Canal Zone, *July 15, 1915.*

Sir: In accordance with the Acting Governor's circular letter of June 19, 1915, I have the honor to submit the following relative to the operations of the mechanical division for the fiscal year ended June 30, 1915.

Organization.—The general organization of the division was the same as for the last fiscal year. The superintendent, assistant superintendent, mechanical engineer, chief clerk, and traveling engineer, together with certain subordinates in clerical and drafting positions, were considered as on general duty in the division. There was an authorized organization for each establishment, but the approval of the organization of the division as a whole permitted draftsmen, foremen, clerks, and mechanics to be detailed by the superintendent to any shop or plant as might seem desirable to insure the best accomplishment of the work. This arrangement gives the greatest flexibility and permits the minimum of excess positions in the organization to allow for temporary fluctuations in force caused by resignations, leaves, and other casualties.

In addition to their general duties, the assistant superintendent has been in special charge of the Balboa shops and the mechanical engineer in charge of the oil-fuel pumping plants.

At the end of the fiscal year the establishments in operation by the division consisted of the Balboa shops, including car shop and roundhouse, the Paraiso shops, the Cristobal Dry Dock shops, the Cristobal roundhouse, the Cristobal car shop, car inspection forces at Balboa and Mount Hope, fuel-oil pumping plants at Balboa and Mount Hope, and a small hostling establishment at Gamboa. All other establishments in operation at the end of the previous fiscal year were discontinued at various times, in accordance with comments contained in the paragraphs below.

The general character of the work performed by the mechanical division is in a state of transition from the construction conditions, under which the majority of the work was on railroad and railroad excavating equipment, to the condition of operation, under which the amount of railroad equipment to be looked after will be small and the railroad excavating equipment almost nil. Under the operating conditions work on dredging equipment and work on floating equipment of other kinds, together with such work as may come to the shops from vessels using the canal, will constitute the majority of the work.

In September, 1914, the condition of dredging work in the Cut justified the belief that there would be no difficulty in maintaining the canal open for maximum traffic without interruption, and expected changes in through freight transportation incident to the policy of transporting through traffic by water whenever possible gave every reason to anticipate that a large amount of railroad equipment might soon be retired. It was therefore believed that the ultimate operation condition was rapidly approaching. The breaking out of the slides in October and the unsettled freight transportation conditions hinging thereon, and later the washing away of the trestle for the east breakwater, made it necessary to retain in service much railroad equipment which it had previously been expected would be retired. This retarded the change in the character of the force employed, even though the continuance of the slides in the Cut very much increased the work necessary to keep dredging equipment in operative condition, and served to increase the number of employees with marine experience. The large amount of work on dredging division equipment made it necessary to retain the Paraiso shops in service, and these shops, as well as the dry-dock shops, Cristobal, came to be employed almost exclusively on marine work. All the work of railroad character and of mixed character and a small amount of marine work occurring in Balboa Harbor were concentrated at the Balboa shops. This gave the highest efficiency possible under the changing conditions for the mechanical division as a whole, and especially the highest efficiency of the Paraiso and dry-dock shops, but the efficient operation of the Balboa shops was rendered more difficult than would have been the case had the work developed more rapidly toward the operating condition. This comparative inefficiency of the Balboa shops could not be avoided under the conditions existing, especially in view of the nearness of the Paraiso shops to the actual work in the Cut and of the fact that the only dry dock on the Isthmus was located at the dry-dock shops, Cristobal.

Balboa shops.—These shops are the headquarters of the general supervisory force of the division and at them is done all the experimental work and the special drafting. The new office building (building No. 28) was completed and occupied November 22, 1914, permitting the consolidation of clerical, drafting, and supervisory forces in a manner permitting the best efficiency. This building is a three-story, steel-and-concrete structure, well arranged for the offices of the division. For lack of space elsewhere to accommodate the captain of the port, the pilots, and the others officials concerned with the work of entering and clearing ships and putting them through the canal a large part of the second floor of this building was assigned to these officials. It is understood that its location is not suitable for the purpose and while the portion of the building now assigned to this division is sufficient for present needs, it is probable that mechanical division shops or employees necessary when the dry dock is in operation will require the additional space. In the meantime, it is understood that the marine superintendent is desirous of finding a location elsewhere for his office, and the other officials would naturally move to the same locality on account of the intimate relation of their duties to the duties of the captain of the port. The office of the storekeeper (Balboa) is also located on this floor. The intimate relation of his duties to those of the mechanical division makes this location very satisfactory and it is believed that it should be continued.

The work of the division of terminal construction on the buildings and grounds was advanced materially during the year, and the amount of work remaining to be done on June 15, 1915, was so small that it was deemed desirable to officially turn the plant over to this division on that date with the understanding that uncompleted work would be completed as circumstances permitted. This uncompleted work consisted principally in lining up the railroad tracks which had settled through settling of the made ground on which the shops are located; straightening up some of the buildings which had settled from similar causes; completing the temporary incline leading into the dry-dock excavation; installing the pumps for the dry dock and the air compressors housed in the same building; constructing the toilet building for special use of vessels in dock and of the pumping plant forces; completing the systems of piping and the pipe tunnel where necessarily uncompleted on account of the temporary incline to the dock and the uncompleted state of the air compressor installation; completing the repair wharf and the filling back of it and about building No. 1; and other miscellaneous minor items incident to placing in operation an establishment of such size and character. The buildings as constructed and the arrangement of the shops and storehouses have proven very satisfactory for the purposes for which they were provided, and when the work still uncompleted has been finished the canal will possess in this establishment a plant of unusual efficiency and capacity.

Present indications are that when the new dry dock is finished and in service a considerable business may be done in docking vessels using the canal, especially such as have occasion to lie for short periods at one of the canal ports awaiting orders. At a suitable time recommendation will be made as to the rates which should be charged for the use of the dock and the conditions under which it may be used by private vessels. Its immense size will make it less economical for vessels of ordinary size and for the average vessel using the canal than dry dock No. 2 would have been had it been completed. Inasmuch, however, as the care of any fleet detailed for the protection of the canal was the primary object in building any dock, the completion of the larger dock was necessary rather than that of the smaller.

Use so far has demonstrated the desirability of adding a few large tools to the equipment of these shops, especially a lathe capable of turning large crank shafts and turbine rotors and long tail shafts for vessels; also a pair of heavy rolls and the necessary punches, shears, and plate planers for working plates seven-eighths inch in thickness and heavier. Of these tools, the large lathe is the most important, and in my estimates submitted for the current fiscal year an item of $100,000 was included for the purchase of the equipment referred to. The addition of these tools would permit the plant to perform any work likely to be required of it under any conditions, including those which would exist if a fleet of vessels were in the vicinity for the defense of the canal. The foundry, capable of making steel castings up to 5 tons and iron castings up to 10 tons, will be especially valuable under these conditions.

To fulfill the highest requirements under all conditions, it will be necessary to keep on hand a large stock of shipbuilding material against the possible injury of ships assigned for defense of the canal during war, and steps have been taken looking to the tentative preparation of lists of such material.

Throughout the whole year air for use at these shops was supplied by the electrical division from the old power plant at Balboa, which also supplied the air for terminal construction work, including the operation of Sosa Hill quarry and, for a while, Ancon quarry. It was anticipated that the installation of the new electric-driven air compressors at the shops would permit discontinuing this power plant not later than January 1, 1915. Accordingly, the repairs to this plant were reduced to the minimum possible, and the necessity for maintaining it in operation so much longer than was anticipated resulted in costly service for compressed air. The long leads of air pipe (at times spread over practically the whole of Balboa townsite, and leading also to Ancon quarry) resulted in heavy loss through leaks and friction which added to the high cost resulting from its run-down condition. About November, 1914, it became apparent that the old Balboa plant must be retained in use for a number of months and that material saving would result from the temporary installation of a 2,500-foot steam-driven compressor at building No. 14 to furnish all air at night and additional air when necessary during the day. This was accordingly done with most satisfatory results.

Uneconomical transitional conditions existed, also, elsewhere in the electrical division and in the transportation division and resulted in high cost in those divisions, of which the high cost of air from the old Balboa plant, as outlined above, was a sample, and these high costs affected many costs of the mechanical division, causing them to be much in excess of what may be expected when normal operating conditions have been reached. Most of these excessive charges had to be taken up in the shop expense of the Balboa plant, and the generally disorganized condition of the plant, due to its unfinished condition, also resulted in high cost for direct labor. All of these conditions operating together resulted in a percentage of overhead cost which caused much discussion of the general subject of shop operation and many protests from other divisions as to the cost of their work. The size of the Balboa shops was dictated by the probable needs for shop facilities should a fleet be stationed at the terminals of the canal for its defense, and under normal operating conditions this size will be excessive for the regular requirements and will, in itself, result in a high percentage of overhead. During a part of the year, even under the conditions then existing, the maximum output of the shops was not required, and this also increased the already high overhead. Protests became so numerous that the matter was given an importance not justified by the facts when proper consideration was given to all the governing conditions, including the fact that excessive cost, due to similar conditions in other divisions had to be absorbed to a large extent by this division. The agitation served, however, to attract to the subject serious consideration as to what might be expected under normal operating conditions and led to your consideration of a procedure by which the excessive overhead, due to unavoidable conditions exacted by temporary difficulties and the excessive size of the shops, might be absorbed by the general canal overhead and a percentage of overhead fixed which would fairly represent efficient management, this percentage only to be charged on work for individuals and companies and on ships using the canal. You decided that this could not be done without specific authority of Congress and it became necessary, therefore, to charge out the total cost in the shop overhead, but the agitation of the subject resulted in placing on record the data explaining why the cost was so high.

The local organization of the shops continues as outlined in the last annual report. The assistant superintendent exercises direct supervision in addition to his general duties. The machine department is presided over by General Foreman S. G. Shearer, assisted by Assistant General Foreman C. S. Perry. Included in this department are the machine shop, smithary, boiler shop, plumbing and pipe-fitting shop, foundry, pattern shop, instrument repair shop, and outside foremen for marine work. The woodworking department is supervised by General Foreman A. O. Herman, and includes the planing mill, carpenter and joiner shop, car shop and paint shop. The roundhouse is a separate department under the supervision of Roundhouse Foreman R. A. Compton, assisted by Night Foreman A. H. Harvey. When the dry dock is in service, it is probable that an additional department covering its supervision will be desirable.

As work decreased, prior to the breaking out of the slides in the Cut, it became possible to materially reduce the force and to lay off various night shifts, these being discontinued on dates as follows: Boiler shop, October 18, 1914; machine shop, September 20, 1914; planing mill, August 19, 1914; pipe shop, September 20, 1914.

With the increase of work incident to the breaking out of the slides, it was necessary to do a considerable amount of work outside of hours for the regular day shift, but the quantity was not sufficient to justify reestablishing night shifts.

The number of men employed, the pay roll, and other details of similar nature relative to these shops are shown by tables attached.

Cristobal dry dock shops.—These shops continued in operation during the whole year, the amount of work performed on dredging division equipment subsequent to the breaking out of the slides in October gradually increasing to a maximum at the end of the year. Subsequent to July 1, 1914, the amount of work had decreased to an extent which permitted the night shifts to be discontinued on October 31, 1914, but after the slides began the amount of work required on the underwater portions of floating equipment, which could be done only in one dry dock available at this plant, necessitated reestablishing a small night shift on January 18, 1915, which shift is still in service.

In the absence of knowledge as to the amount of work likely to be done at these shops under operating conditions, the repairs to buildings and equipment have been reduced to the minimum consistent with present operation. The shops are not well arranged and the buildings are not in the best condition, but it does not seem desirable to spend any money on them at present except such as is absolutely necessary to keep them in service for present needs. When it becomes possible to determine just what the requirements will be, they should be rearranged to fit these requirements.

Conditions as they developed, however, justified the installation at this point of one of the 2,500-foot electrically driven air compressors purchased for installation at Balboa, but which it is believed will not be needed at that point under operating conditions; also authority was received for installing electric motors for driving the dry-dock pumps and for an intercommunicating pipe line between the air-compressor plant at these shops and the air-compressor plant at the roundhouse, Cristobal. This rearrangement will ultimately permit dismantling the present inefficient compressor plant at the roundhouse and doing away with all but one boiler at the dry dock. When a small compressor now in use on the Isthmus is available, it is proposed to install it in addition to the 2,500-foot compressor to care for the reduced amount of air likely to be required outside of regular working hours. The quantity of air required at present is in excess of the capacity of the electric compressor to supply, owing to the work on Pier 7; hence, until that pier is completed, part of the steam compressors must remain in service.

The dry dock at these shops has been of inestimable value to the canal. The hard usage to which floating equipment has been subjected during work on the slides has made it necessary to keep the dock filled almost continuously to its maximum capacity, and only by its use has a large amount of this equipment been enabled to perform its work. Aside from work on dredging equipment, the submarines of the first division submarine flotilla, Atlantic Fleet, United States Navy, were docked in October and November, 1914, and three of these vessels were again docked in June of the present year. The United States Navy survey ship *Leonidas* was also docked in May, 1915, and it is expected that the other two submarines of the first division submarine flotilla, Atlantic Fleet, will be docked during the present month. Aside from these vessels for the Navy Department, the Panamanian national steamship *Chitro* (later renamed the *San Blas*) was docked on January 21 and February 1, 1915. The following vessels were docked for private individuals and companies: Steamships *Freda*, *Nemesis*, *Acajutla*, *Salvador*, and schooner *D. L. Lynton*.

The Cristobal Dry Dock shops are under the direct supervision of General Foreman C. J. Reilly, who has exercised this supervision since October 1, 1909.

The number of men employed, the pay roll, and other details of similar nature relating to these shops are shown by tables attached.

Paraiso shops.—When the estimates were submitted in September, 1914, for the current fiscal year, it was anticipated that these shops would be closed not later than January 1, 1915. The occurrence of the New Culebra slide October 14–15, 1914, and the subsequent additional movement of the Cucaracha slide and the Culebra slide have necessitated keeping them in service, and the present prospects are that it will be necessary to continue them for another year. The number of men at present employed is in excess of those of any previous time, and, in addition to the day shift, a night shift has been necessary throughout the whole year.

The equipment of this shop as originally installed was intended to cover only repairs to dredging equipment which could not be efficiently performed at the dry-dock shops, Cristobal, or at Balboa. This equipment has been increased by the addition of a set of plate rolls and a wood planer, together with a small number of other tools of minor importance. Upon discontinuance of the Empire air-compressor plant three 550-foot electrically driven air compressors, acquired from the McClintic-Marshall Construction Co., were installed to supply air to these shops. They have been barely sufficient for the purpose and promise to be inadequate in the near future, so that some substitute or addition must be provided for. This is now under consideration. When these compressors are available they, together with the fourth compressor of identical design now temporarily in use by the terminal construction division at the Cristobal coal plant, should be installed, one at each of the roundhouses and one each at the Cristobal Dry Dock shops and Balboa shops, in order to provide air at the least possible cost for work at irregular hours.

The buildings of Paraiso shops are of temporary character, and a considerable portion of the work is necessarily performed in the open.

The organization in effect at the Paraiso shops at the close of the last fiscal year was continued. Mr. James Macfarlane, superintendent of dredging, exercised general supervision over the shops in addition to his dredging division duties, one-half of his pay being charged to the mechanical division for this service.

The number of men employed, the pay roll, and other details of similar nature relating to these shops, are shown by tables attached.

Cristobal roundhouse.—The Cristobal roundhouse continued in operation during the year, most of the time under the supervision of Mr. J. M. Abston, roundhouse foreman. The amount of work performed decreased considerably, and some minor changes in the equipment were made, but nothing of material consequence, except the tearing down of the old coal-chute building, which was in need of considerable repairs, and its operation was found to involve greater cost for coaling engines than would result from handling the coal by shovels; also the large toilet building, which had deteriorated very badly, was torn down and replaced by a toilet building of smaller size suitable for the reduced force in employ in the district.

By means of the interconnecting pipe line between the roundhouse and the dry dock it has been possible to supply air to both plants from a single compressor plant, this resulting in material economy. When the work on Pier 7 at Cristobal has been completed, it is anticipated that the air-compressor plant at this roundhouse will be placed out of use entirely except at night, when there is no night work under way at the dry-dock shops and when one of the small compressors mentioned above as previously in use by the McClintic-Marshall Construction Co. becomes available it is proposed to install it for carrying this night load, and the most efficient arrangement possible will then have been provided.

Hostling.—The small hostling establishment at Empire was discontinued September 30, 1914, but later, on account of inability to find quarters elsewhere for the employees occupying houses at Culebra, this establishment was reestablished at Culebra and continued until April 11, 1915, when it was permanently discontinued.

The small hostling establishment at Paraiso was continued until February 19, 1915, when changes in passenger transportation made it possible to hostle engines for the Balboa-Paraiso labor-train service at Balboa.

The small hostling establishment at Gatun was discontinued February 19, 1915, but subsequent to that time, until after the close of the fiscal year, a small force has been in employ from time to time at that point to prepare the equipment stored on the west side of the canal for emergency use on the Gatun Dam and to lay the same up in condition for immediate service if required; also to make running repairs on same while placing additional earth fill west of the spillway on the dam during March and April, 1915.

On June 15, 1915, it became necessary to hostle an engine at Gamboa in connection with Chagres River sand service, and a colored hostler was detailed to look after this engine under the immediate supervision of the engineer. This arrangement was still in force at the expiration of the fiscal year.

Car-inspection service.—The car-inspection service at Mount Hope continued, under the supervision of Assistant Foreman William Markham, under the general supervision of the general foreman of the car department at Balboa. On March 29, 1915, due to the impossibility of taking care of the special rush of work on cars, it was deemed necessary to reopen the old Cristobal car shops temporarily for making repairs to box cars and Rodger ballast cars which had been allowed to deteriorate to a great extent due to uncertainty as to the amount of equipment of this kind which would be required under operating conditions. The tools supplied consisted only of a cut-off saw, a jointer, and a saw table, which were temporarily installed, practically all of the material being cut to size at Balboa and shipped down ready for use. The amount of work in the Balboa car shops incident to repairing cars sold to the Chicago House Wrecking Co. and to the Alaskan Engineering Commission, together with work on dump cars and steel flats (delayed to the greatest possible extent on account of uncertainty as to necessity for it) so crowded the Balboa car shop as to make it impossible for that shop to care for the box car and Rodger ballast car work. It is anticipated that the performance of this work at Cristobal may be discontinued July 24, 1915, and that subsequent to that date all car work may be taken care of in the Balboa shops. The supervision of this car work at Cristobal was placed under Assistant Foreman Markham, in addition to his general inspection duties, and has been efficiently performed by him.

Floating derricks.—The *Ajax*, the first of the two floating derricks contracted for in Germany, arrived on the Isthmus July 9, 1914, and the second, the *Hercules*, arrived July 23, 1914. The jibs for these derricks were assembled on the east shore of the lower lock at Gatun, and were placed on board the pontoons while the latter were afloat in the lock. The tests of the *Ajax* were undertaken, but prior to their completion the necessity for removing the remnants of the exploded drill barge *Teredo* in the Cut resulted in her being taken there for the performance of this work. On December 7, 1914, while the tests were under way, the jib collapsed entirely and after the contractors had been directed to strengthen up the jib of the *Hercules*, the tests on that derrick were proceeded with. She was finally accepted March 30, 1915, and turned over to the mechanical division for operation in connection with a general wrecking service including these two derricks and the railroad wrecking equipment. The *Hercules* is now stationed at Paraiso so as to be handy for work on dredging equipment which constitutes the greater portion of the work required of it. The material for the new jib of the *Ajax* is now being erected and upon completion and acceptance this derrick will be stationed somewhere north of the Cut. In general, the operation of the *Hercules* has been satisfactory, and, although the cost of maintenance of these two derricks will be very high, they are valuable equipment for canal purposes, especially in the event that a vessel should be sunk in the Cut or in any of the locks, or in the event that it should be necessary to lift the lock gates for any purpose. The pontoons for these floating derricks were docked in the upper west lock at Gatun November 9, 1914, to permit cleaning and painting the underwater bottom.

Fuel-oil handling plants.—Your orders directed that upon completion of the fuel-oil handling plants at Balboa and Mount Hope they be placed in service by this division and that when in efficient operating condition they be transferred to the supply department. The Balboa plant was placed in condition for service on January 12, 1915, but did not handle all of the fuel oil until January 28, 1915. In the meantime the Union Oil Co. was permitted to operate its pumping plant to supplement the canal plant. The Mount Hope plant was first operated February 25, 1915, and began to accomplish the complete service at that end of the canal on March 8, 1915. Data as to the amounts of oil handled are contained in the tables attached. The plants were accepted as complete (with minor exceptions) on July 1, 1915, and it is anticipated that they will be in condition for transfer to the supply department as contemplated by your orders about September 1.

The stocks of oil belonging to The Panama Canal have been distributed almost exclusively for canal purposes, the sale price being in excess of what shipping companies could obtain oil for from private corporations. So far, oil has been delivered for private corporations only for the Union Oil Co. and the Panama Agencies Co. All oil, whether for The Panama Canal or for private companies, must be handled by the Panama Canal plants and must be delivered to vessels or elsewhere through the Panama Canal pipe lines. The prices fixed for the sale of Panama Canal oil to individuals and companies is for the purpose of regulating prices rather than of obtaining business for The Panama Canal. A suitable price is charged the private companies for pumping their oil and for the use of the plant and pipe lines. So far, it has been possible to handle all oil deliveries with a single shift at the plant, supplemented by employees temporarily detailed from the mechanical division shops. This procedure has resulted in considerable saving, and until deliveries are materially in excess of those at present the practice should be continued.

General.—The expenditures and the number of employees in the various establishments of the division and the division as a whole are given in the tables attached.

The maximum expenditures for the division as a whole were for the month of March, 1915, and amounted to $460,095.46, divided as follows:

Balboa shops	$223, 368. 30
Dry-dock shops, Cristobal	42, 119. 74
Paraiso shops	44, 950. 79
Roundhouse, Cristobal	14, 021. 95
Fuel-oil plants (including $133,200.68 for value of oil handled)	135, 634. 68

The maximum number of employees in the division was in July, 1914—972 on the gold roll and 2,337 on the silver roll, distributed as follows:

	Gold.	Silver.
Balboa shops	666	1, 356
Dry-dock shops, Cristobal	163	582
Paraiso shops	99	217
Roundhouse, Cristobal	12	68
Miscellaneous	32	114

The minimum expenditures for the division as a whole were for the month of February, 1915, amounting to $309,073.97, distributed as follows:

Balboa shops	$218,959.55
Dry-dock shops, Cristobal	38,109.50
Paraiso shops	38,606.48
Roundhouse, Cristobal	11,164.33
Oil plants	2,234.11

The minimum number of employees was during the month of December, 1914—783 on the gold roll and 1,626 on the silver roll, distributed as follows:

	Gold.	Silver.
Balboa shops	553	941
Dry-dock shops, Cristobal	94	316
Paraiso shops	98	226
Roundhouse, Cristobal	10	41
Miscellaneous	28	102

The present prospects are that the force now employed is the maximum likely to occur; and if control is obtained over the slides in the Cut, this number will be materially reduced in the near future.

One of the great difficulties experienced during the year has grown out of the lack of hotel accommodations near the shops and to lack of quarters readily available. The temporary office building at the Balboa shops, when it was vacated, was fitted up for lunch-room purposes, and this action and the completion of additional quarters at Balboa greatly improved conditions at the Balboa shops; but it was still necessary to provide labor-train service, which constituted a considerable item of cost in the shop overhead. Lack of quarters near the other shops made it necessary to run labor trains to serve them, and its cost constituted a material percentage of the overhead of those shops. With the abandonment of Corozal and the removal of employees quartered there into the new quarters under construction at Balboa, and with the abandonment of the Paraiso shops, these adverse conditions will gradually be reduced to the minimum.

The accounting system established for the division has been operated throughout the year and has proven of marked value in permitting the cost to be analyzed and greater efficiency to be obtained. Some minor modifications have seemed desirable from time to time and, after proper consideration, have been made with the approval of the auditor. As a whole, the system has proven itself well adapted for the purpose.

The cessation of work which could be computed on a cost-per-unit basis has made it still more apparent that the cost of supervision of canal employees must be higher than was the case during the construction period. By placing the operators of the equipment producing it on a competitive basis work of this character constitutes those operators, to a considerable extent, supervisors of the repair work necessary for such equipment and permits corresponding reduction in supervisory force in the shops proper. Under present conditions this work is practically all completed. The work in hand is sufficient to justify the expectation that only moderate discharges will be necessary in the immediate future; but before the close of this fiscal year it will be necessary to lay off a large number of men, and this fact is well known to the employees themselves. This constitutes a most unsatisfactory condition for the efficiency of shop management, since there are always a considerable number of men in an establishment as large as the mechanical division who will render efficient service with moderate supervision only when there is probability of long continuance in service. Even under the best supervision when the amount of work performed each day admittedly shortens the length of time which must elapse before discharges are made it is difficult to obtain really efficient results. These conditions, especially during the first quarter of the last fiscal year, materially affected the efficiency of the division, but reductions in force necessary at that time permitted weeding out the less efficient employees, with the result that when the present rush of work began the force as a whole was rather above the average efficiency to be expected in organizations of like character. The foremen, as a general rule, have been efficient in their duties, and it was only by their conscientious devotion to their duty that the efficiency has been as high as it is.

The efficiency of the division as a whole has also been affected adversely by the amount of overtime work required. The distance of the Isthmus from labor markets and the impossibility of foreseeing exactly what demands would be made on the shops, especially demands for work on dredging division equipment in service in the Cut, has made it impossible to foresee the needs for increases sufficiently far in advance to permit the men to be obtained from the States at the best time. Ordinarily, at least two weeks are necessary, even when cable requisition is made, for the first man to report after employment in the States, and requisitions are rarely fully filled in less than six to eight weeks. The character of the work, as well as its quantity, was so uncertain that the force available (in spite of the fact that practically every applicant on the Isthmus was employed for such work as he could do) was generally, throughout the last six months, less than required, and urgent work on floating equipment required much overtime work. This condition was rendered more acute by the operation of the leave regulations, comment relative to which will be made under subsequent paragraphs.

Overtime work in this climate is, in my opinion, inconsistent with the best interests of both the employee and the employer. In spite of the possibility of greatly increasing the income of individual employees by overtime work, many of them properly object to being detailed for overtime work. The necessity which has existed for a considerable portion of the year that large amounts of overtime work be done created dissatisfaction on the part of employees, which has found expression in numerous reports and protests by shop committees as well as by individual men. Since the mechanical division employs the majority of the mechanics on the Isthmus, and probably half of the total number of citizens of the United States on hourly pay on The Panama Canal, and inasmuch as the mechanic trades are those most likely to be associated in unions, a large percentage of these protests and complaints have come from employees of this division. Investigations and reports in connection therewith have taken much of the time of the superintendent, assistant superintendent, and general foremen, in addition to the time required of the Governor and Acting Governor in the same connection. The question of work to be assigned to aliens (generally colored West Indians) and protests against the employment of Panamanian citizens on the same basis as citizens of the United States, has constituted a large percentage of the protests received. Under construction conditions, when the demand for mechanics was in excess of the number which could be obtained from the States, the comparative number of protests along these lines was small. Now, however, with industrial conditions in the United States in a most unsatisfactory condition, with a comparatively small number of positions now available, and with the prospect that the number will materially decrease in the near future, this matter has assumed important proportions. Inconsistencies, growing out of past practice and different methods of handling men in the various divisions, and perfectly legitimate when they occurred, have given excuses for protests which would not otherwise exist, but which can not, in the present state of development of the work, be avoided.

The issue of new appointments, effective April 1, 1914, to all employees on the gold roll on that date has resulted that under the present leave regulations all such employees had to begin their annual leave (if taken alone) in February or March or (if taken with cumulative leave) between February 1 and May 31, unless the condition of work required postponing cumulative leave for the good of the service. With the large percentage of gold men employed in this division, the absence of employees on leave hampered the work very greatly. It was considered that every reasonable effort should be made to grant annual leave to such employees as desired to take it alone, since otherwise it would be forfeited. On annual leave alone, employees were absent as follows during the months of February and March for periods in excess of six days:

February 6	18	March 6	85
February 13	45	March 13	95
February 20	48	March 20	92
February 27	44	March 27–31	106

On cumulative leave alone, or in conjunction with annual leave, and on unexpired annual leave begun prior to April 1, employees were absent as follows:

February 6	31	April 24	95
February 13	46	May 1	100
February 20	68	May 8	98
February 27	60	May 15	85
March 6	52	May 22	110
March 13	96	May 29	116
March 20	118	June 5	115
March 27	119	June 12	115
April 3	123	June 19	111
April 10	101	June 26	97
April 17	98	June 30	76

In addition to the leave actually granted effective prior to June 1, the leave of about 50 employees was postponed on authority from your office for the good of the service.

During the month of March, which was the critical month, 287 employees were absent at some time for a period of six days or more and, when it is considered that the entire gold roll of the division was about 835 employees, it may readily be seen how difficult was the problem of carrying out the work efficiently. This problem was rendered still more difficult of solution by the attempt made to comply with requests of other departments and divisions for temporary assignments to take the place of their employees on leave and by the fact that conditions which could not be foreseen required the performance of an extra large amount of work on Panama Railroad and dredging division equipment and on equipment released to the Alaskan Engineering Commission.

There is a general tendency, when choice of date is possible, for employees intending to visit the States, to ask for leave effective about May 1 or September 1. This avoids cold weather in the States with the danger of colds, etc., incident to great change of temperature, also the expense for heavy clothes, while at the same time permitting sufficient change of climate to be beneficial to the health. Under conditions as they existed this year, no advantage could be taken of the fall season except when the head of the division was unable to spare the services of the employee for several months and leave, therefore, had to be postponed for the good of the service. Few leaves required to be postponed for that length of time; hence the benefits to health for employees who might have chosen to go in the fall, rather than early in February or late in May, was reduced to the minimum.

With a gold force as large as that employed by the mechanical division, four months (i. e., two months prior to and two months after the expiration of the service year) do not, under conditions now existing and likely to exist for at least two or three years yet to come, give sufficient latitude for granting leave to all employees who are entitled to it without seriously reducing the efficiency of the organization. It would seem desirable to consider some modifications permitting more latitude, and it is suggested that the modification might well consist in allowing cumulative leave for any service year to be taken at any time subsequent to the expiration of 10 months' service during the year and by allowing it to be combined with any unused annual leave for the current year or the previous year not in excess of 24 days. No change should be made in the present regulations relative to accumulation of cumulative leave, nor in the provision that leave may be taken only when the employee's services can be spared.

As soon as resignations, discharges, and other casualties have operated to distribute the dates on which the service year of employees begin fairly uniformly throughout the year, the bad results, chargeable to the fact that practically all service years now date from April 1, will be avoided; but there will still remain the disadvantage that many employees must take their leave at seasons when, on account of extreme heat or extreme cold in the States, the beneficial effects to be obtained from leave will be almost nullified.

Another thing that has given ground for complaint and for requests for postponement of leave is the fact that unless such employees take leave in the hottest part of the summer those who have children must take them out of school or else leave them on the Isthmus. Quite a number of requests for postponement on this ground were received from employees, but your office decided that it was not a reason which would justify postponement under the regulations. It seems to me that this is a condition which should receive serious consideration and which might be met by a change in the opening date of the school year so as to allow children to be taken to the

States during either the spring or the fall without having to miss school. My contact with the boys of the Zone, incident to the employment of apprentices, indicates that the children of employees do not receive proper benefit from the excellent school system. This is no doubt largely due to carelessness on the part of parents, and this carelessness may reasonably be expected to be less under operating conditions than was the case under construction conditions; but at best, even if there is room for choice (which does not exist now), parents will be too prone to take their leave at the best season for comfort in the States, regardless of any interference with the schooling of their children which it involves, and the fitting of children for the best accomplishments in after life will thereby be interfered with.

On March 11, 1915, you approved a set of regulations governing the employment of apprentices in the Panama Canal shops, as a result of which the number of apprentices has been increased and a definite system of instruction has been established, both in the shops and in studies connected with the trades chosen. The system as adopted promises to be most beneficial and to give to the sons of employees an opportunity to fit themselves for after life in a manner not hitherto possible. The establishment of industrial training in the Zone schools is also beneficial along the same lines.

Tables as follows, showing various phases of the operations of the mechanical division for the fiscal year 1915, are attached; plate 126 shows the organization in effect July 1, 1915:

Table 1. Abstract of expenditures of the entire division, showing distribution of charges and overtime work performed.
2. Abstract of expenditures of the mechanical division shops only, showing distribution of charges and overtime performed.
3. Abstract of expenditures for Balboa shops only, showing distribution of charges and overtime performed.
4. Abstract of expenditures for Cristobal Dry Dock shops only, showing distribution of charges and overtime performed.
5. Abstract of expenditures for Paraiso shops only, showing distribution of charges and overtime performed.
6. Abstract of expenditures for the Cristobal roundhouse only, showing distribution of charges and overtime performed.
7. Abstract of expenditures for fuel-oil plants, Balboa and Mount Hope, showing the cost of operation, quantities of oil handled, and the unit cost.
8. Abstract of expenditures for the operation of the foundry, Balboa shops.
9. Number of repairs to locomotives.
10. Number of repairs to equipment other than locomotives and cars.
11. Number of shop and field repairs made to different classes of cars.
12. Amount of equipment hostled, and the cost.
13. Expenditures and output of the oxy-acetylene plant, Balboa shops.

Respectfully submitted.

D. C. Nutting,
Superintendent Mechanical Division.

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

TABLE NO. 1.—*Abstract of expenditures of the mechanical division, showing distribution of charges and overtime work performed.*

Month.	Abstract of expenditures.			
	Labor.	Material.	Other expense.	Total.
1914.				
July	$203,560.57	$148,438.27	$92,375.33	$444,374.17
August	199,935.28	155,356.26	82,218.44	437,509.98
September	183,568.64	143,670.65	56,705.74	383,945.03
October	179,780.12	165,858.27	47,035.41	392,673.80
November	155,906.69	225,751.98	49,672.56	431,331.23
December	161,587.95	126,989.63	106,299.17	394,876.75
1915.				
January	157,364.74	185,771.68	50,913.20	394,049.62
February	153,179.25	113,425.28	41,785.39	308,389.92
March	176,127.16	240,861.20	43,107.10	460,095.46
April	169,766.64	181,309.22	53,262.71	404,338.57
May	175,968.67	157,071.18	54,350.39	387,390.24
June	181,198.67	209,540.18	49,423.08	440,161.93
Total	2,097,944.38	2,054,043.80	727,148.52	4,879,136.70
Average per month this year	174,828.69	171,170.32	60,595.71	406,594.72
Average per month last year	229,220.02	196,464.78	55,407.17	480,091.97

Month.	Distribution of charges.			Overtime.	
	Individuals and companies.	Panama R. R.	Divisions and departments.	Amount.	Per cent of total.
1914.					
July	$2,749.86	$85,070.49	$356,553.82	$10,933.80	5.37
August	2,742.17	78,539.99	356,227.82	9,747.37	4.82
September	2,146.82	75,373.99	306,424.22	7,853.80	4.28
October	3,762.32	77,125.61	311,785.87	8,301.52	4.62
November	6,308.47	87,034.05	337,988.71	11,972.61	7.68
December	2,487.87	131,228.92	261,159.96	7,899.15	4.89
1915.					
January	8,386.12	[1] 69,027.50	316,636.00	9,925.32	6.31
February	7,221.53	58,855.00	242,313.39	9,905.41	6.47
March	7,802.24	75,667.21	376,626.01	11,482.00	6.52
April	14,593.25	90,082.83	299,662.49	10,606.00	6.25
May	13,514.12	75,104.62	298,771.50	14,974.37	9.48
June	7,765.22	97,258.87	335,137.84	17,874.19	9.86
Total	79,479.99	1,000,369.08	3,799,287.63	131,475.54	6.27
Average per month this year	6,623.33	83,364.09	316,607.30	10,956.29	6.27
Average per month last year	10,009.65	42,083.69	427,998.63	19,313.00	8.43

[1] Includes value of Panama Canal fuel oil handled by fuel-oil plants. For amounts, see Table No. 7.

TABLE NO. 2.—*Abstract of expenditures of the mechanical division shops only, showing distribution of charges and overtime work performed.*

Month.	Abstract of expenditures.			
	Labor.	Material.	Other expense.	Total.
1914.				
July	$203,560.57	$148,438.27	$92,375.33	$444,374.17
August	199,935.28	155,356.26	82,218.44	437,509.98
September	183,568.64	143,670.65	56,705.74	383,945.03
October	179,780.12	165,858.27	47,035.41	392,673.80
November	155,906.69	225,751.98	49,672.56	431,331.23
December	161,587.95	126,989.63	106,299.17	394,876.75

TABLE NO. 2.—*Abstract of expenditures of the mechanical division shops only, showing distribution of charges and overtime work performed*—Continued.

Month.	Abstract of expenditures.			
	Labor.	Material.	Other expense.	Total.
1915.				
January	$156,888.00	$130,478.03	$50,566.50	$337,932.53
February	152,481.55	112,903.67	41,454.64	306,839.86
March	175,195.89	107,006.50	42,258.39	324,460.78
April	168,788.53	124,549.09	52,001.57	345,339.19
May	174,966.42	140,976.33	53,292.27	369,235.02
June	180,083.17	155,092.30	47,791.43	382,966.90
Total	2,092,742.81	1,737,070.98	721,671.45	4,551,485.24
Average per month this year	174,395.23	144,755.92	60,139.29	379,290.44
Average per month last year	229,220.02	196,464.78	54,407.17	480,091.97

Month.	Distribution of charges.			Overtime.	
	Individuals and companies.	Panama R. R.	Divisions and departments.	Amount.	Per cent of total.
1914.					
July	$2,749.86	$85,070.49	$356,553.82	$10,933.80	5.37
August	2,742.17	78,539.99	356,227.82	9,747.37	4.88
September	2,146.82	75,373.99	306,424.22	7,853.80	4.28
October	3,762.32	77,125.61	311,785.87	8,301.52	4.62
November	6,308.47	87,034.05	337,988.71	11,972.61	7.68
December	2,487.87	131,228.92	261,159.96	7,899.15	4.89
1915.					
January	8,310.68	69,027.50	260,594.35	9,925.32	6.33
February	6,226.18	58,649.46	241,964.22	9,905.41	6.50
March	7,342.04	75,511.65	241,607.09	11,482.00	6.55
April	13,397.85	89,686.22	242,255.12	10,606.00	6.28
May	12,396.31	74,724.17	282,114.54	14,974.37	8.56
June	6,576.18	96,813.36	279,577.36	17,874.19	9.93
Total	74,446.75	998,785.41	3,478,253.08	131,475.54	6.28
Average per month this year	6,203.90	83,232.12	289,854.42	10,956.30	6.28
Average per month last year	10,009.65	42,083.69	427,998.63	19,313.00	8.43

TABLE NO. 3.—*Abstract of expenditures, mechanical division, for Balboa shops only, showing distribution of charges and overtime work performed.*

Month.	Abstract of expenditures.			
	Labor.	Material.	Other expense.	Total.
1914.				
July	$143,307.80	$121,773.06	$66,333.79	$331,414.65
August	141,592.87	126,818.35	64,897.53	333,308.76
September	127,608.62	113,950.91	40,275.68	281,835.21
October	121,463.92	129,587.60	34,505.06	285,556.58
November	103,469.43	198,666.98	33,613.31	335,749.72
December	109,797.65	95,054.50	31,677.61	236,529.76
1915.				
January	104,805.74	88,860.73	33,622.47	227,288.94
February	101,014.87	87,338.00	30,576.68	218,959.55
March	116,992.95	76,856.94	29,518.41	223,368.30
April	110,377.39	85,432.91	34,162.52	229,972.82
May	113,155.29	103,847.75	34,933.62	251,936.66
June	116,291.77	118,375.55	31,845.63	266,512.95
Total	1,409,908.30	1,346,563.29	465,962.31	3,222,433.90
Average per month this year	117,492.36	112,213.61	38,830.19	268,536.16
Average per month last year	191,053.61	173,413.66	43,715.48	408,182.75

TABLE NO. 3.—*Abstract of expenditures, mechanical division, for Balboa shops, only, showing distribution of charges and overtime work performed*—Continued.

Month.	Distribution of charges.			Overtime.	
	Individuals and companies.	Panama R. R.	Divisions and departments.	Amount.	Per cent of total.
1914.					
July	$1,716.93	$67,752.49	$261,945.23	$6,391.49	4.45
August	1,906.94	64,355.38	267,046.44	5,941.20	4.19
September	1,703.04	61,141.52	218,990.65	4,290.28	3.35
October	888.49	56,654.42	228,013.67	3,288.60	2.71
November	1.052.95	62,078.98	272,617.79	6,009.30	5.81
December	829.74	43,107.75	192,592.27	4,581.87	4.17
1915.					
January	4,563.37	57,453.38	165,272.19	4,618.33	4.41
February	3,657.66	47,429.52	167,872.37	3,831.27	3.79
March	3,773.76	62,653.54	156,941.00	7,098.71	6.07
April	5.501.07	77,384.28	147,087.47	5,987.13	5.12
May	2,233.55	64,674.11	185,029.00	7,230.77	6.39
June	1,287.10	81,953.10	183,272.75	8,174.89	7.03
Total	29,114.60	746,638.47	2,446,680.83	67,443.84	4.78
Average per month this year	2,426.22	62,219.88	203,890.06	5,621.32	4.78
Average per month last year	8,250.22	39,919.44	360,113.09	13,317.68	7.0

TABLE NO. 4.—*Abstract of expenditures, mechanical division, for Cristobal dry-dock shops only, showing distribution of charges and overtime work performed.*

Month.	Abstract of expenditures.			
	Labor.	Material.	Other expense.	Total.
1914.				
July	$33,658.96	$15,221.30	$9,069.03	$57,949.29
August	32,343.06	11,310.13	10,621.32	54,274.51
September	31,190.69	14,011.47	8,530.21	53,732.37
October	33,054.92	12,197.11	4,022.61	49,274.64
November	28,574.71	8.664.23	8,054.31	45,293.25
December	26,672.10	9,663.75	68,197.09	104,532.94
1915.				
January	25,718.52	16,414.94	9,280.99	51,414.45
February	25,247.42	9,339.48	3,522.60	38,109.50
March	27.560.41	8,898.94	5,660.39	42,119.74
April	28,245.18	13,396.36	9,834.72	51,476.26
May	32,491.82	13,125.68	10,626.16	56,243.66
June	36,177.51	14,086.48	7,777.35	58,041.34
Total	360,935.30	146,329.87	155,196.78	662,461.95
Average per month this year	30,077.94	12,194.15	12,933.07	55,205.16
Average per month last year	27,149.10	17,665.46	8,363.69	53,178.25

Month.	Distribution of charges.			Overtime.	
	Individuals and companies.	Panama R. R.	Divisions and departments.	Amount.	Per cent of total.
1914.					
July	$1,032.93	$1,620.79	$55,295.57	$1,393.02	4.19
August	623.16	1,436.88	52,214.47	645.24	1.99
September	443.78	2,726.40	50,562.19	1,424.47	4.56
October	2,855.83	9,396.09	37,022.72	2,120.39	6.41
November	5,224.02	15,227.51	24,841.72	2,080.97	7.31
December	1,658.13	77,006.03	25,868.78	1,111.39	4.16

TABLE No. 4.—*Abstract of expenditures, mechanical division, for Cristobal dry-dock shops only, showing distribution of charges, and overtime work performed*—Contd.

Month.	Distribution of charges.			Overtime.	
	Individuals and companies.	Panama R. R.	Divisions and departments.	Amount.	Per cent of total.
1915.					
January	$3,747.31	$587.05	$47,080.09	$3,117.11	1.21
February	2,557.27	1,722.22	33,830.01	2,694.44	1.07
March	3,088.48	3,386.19	35,645.07	1,699.10	6.16
April	6,341.79	1,648.79	43,485.68	1,620.39	5.74
May	7,767.74	728.62	47,747.30	3,797.68	11.69
June	2,150.00	5,702.22	50,189.12	6,393.13	17.68
Total	37,490.44	121,188.79	503,782.72	28,097.33	7.78
Average per month this year	3,124.20	10,099.06	41,981.89	2.341.46	7.78
Average per month last year	1,759.42	2,158.24	49,260.59	2,916.54	10.70

TABLE No. 5.—*Abstract of expenditures, mechanical division, for Paraiso shops only, showing distribution of charges and overtime work performed.*

Month.	Abstract of expenditures.			
	Labor.	Material.	Other expense.	Total.
1914.				
July	$22,434.43	$8,574.92	$4,585.18	$35,594.53
August	21,671.24	6,140.21	5,769.25	33,580.70
September	20,404.08	7,964.35	6,498.83	34,867.26
October	21,827.02	13,685.32	5,188.07	40,700.41
November	20,411.83	7,150.94	6,488.81	34,051.58
December	21,310.72	9,895.16	5,737.93	36,943.81
1915.				
January	22,826.76	14,147.05	5,916.48	42,890.29
February	22,987.62	9,921.19	5,697.67	38,606.48
March	27,648.23	11,870.60	5,431.96	44,950.79
April	26,909.86	15,468.48	5,741.09	48,119.43
May	26,361.68	11,555.80	6,104.83	44,022.31
June	24,758.71	11,545.63	6,400.17	42,704.51
Total	279,552.18	127,919.65	69,560.27	477,032.10
Average per month this year	23,296.01	10,659.97	5,796.69	39,752.67
Average per month last year	16,525.96	8,078.50	3,492.02	28,096.48

Month.	Distribution of charges.			Overtime.	
	Individuals and companies.	Panama R. R.	Divisions and departments.	Amount.	Per cent of total.
1914.					
July	....	$10.16	$35,584.37	$2,511.29	11.19
August	....	81.83	33,498.87	2,562.66	11.82
September	....	91.84	34,775.42	1,594.54	7.82
October	....	148.04	40,552.37	2,476.11	11.34
November	....	....	34,051.58	3,273.30	16.04
December	....	27.76	36,916.05	1,748.44	8.20
1915.					
January	....	2.53	42,887.76	1,630.67	7.14
February	....	5.74	38,600.74	2,961.25	12.88
March	....	64.71	44,886.08	2,308.11	8.35
April	....	7.82	48,111.61	2,456.04	9.13
May	....	....	44,022.31	3,398.34	12.89
June	....	47.51	42,657.00	2,879.17	11.63
Total	....	487.94	476,544.16	29,799.92	10.66
Average per month this year	....	40.66	39,712.01	2,483.33	10.66
Average per month last year	$9.00	....	28,087.48	3,078.78	18.60

TABLE NO. 6.—*Abstract of expenditures, mechanical division, for Cristobal roundhouse only, showing distribution of charges and overtime work performed.*

Month.	Abstract of expenditures.			
	Labor.	Material.	Other expense.	Total.
1914.				
July	$4,159.38	$2,868.99	$12,387.33	$19,415.70
August	4,328.11	11,087.56	930.34	16,346.01
September	4,365.25	7,743.92	1,401.02	13,510.19
October	3,434.26	10,388.24	3,319.67	17,142.17
November	3,450.72	11,269.83	1,516.13	16,236.68
December	3,807.48	12,376.22	686.54	16,870.24
1915.				
January	3,536.98	11,055.31	1,746.56	16,338.85
February	3,201.64	6,305.00	1,657.69	11,164.33
March	2,994.30	9,380.02	1,647.63	14,021.95
April	3,256.10	10,251.34	2,263.24	15,770.68
May	2,957.63	12,447.10	1,627.66	17,032.39
June	2,855.18	11,084.64	1,768.28	15,708.10
Total	42,347.03	116,258.17	30,952.09	189,557.29
Average per month this year	3,528.92	9,688.18	2,579.34	15,796.44

Month.	Distribution of charges.			Overtime.	
	Individuals and companies.	Panama R. R.	Divisions and departments.	Amount.	Per cent of total.
1914.					
July		$15,687.05	$3,728.65	$638.00	15.33
August	$212.07	12,665.90	3,468.04	598.27	13.82
September		11,414.23	2,095.96	544.51	12.47
October	18.00	10,927.06	6,197.11	416.42	12.13
November	31.50	9,727.56	6,477.62	609.04	17.64
December		11,087.38	5,782.86	457.45	12.01
1915.					
January		10,984.54	5,354.31	559.21	15.81
February	11.25	9,491.98	1,661.10	418.45	13.07
March	479.80	9,407.21	4,134.94	376.08	12.56
April	1,554.99	10,645.33	3,570.36	542.44	16.66
May	2,395.02	9,321.44	5,315.93	547.58	18.51
June	3,139.08	9,110.53	3,458.49	427.00	11.45
Total	7,841.71	130,470.21	51,245.37	6,134.45	14.49
Average per month this year	653.48	10,872.52	4,270.44	511.20	14.49

TABLE NO. 7.—*Abstract of expenditures, mechanical division, for fuel-oil plants, Balboa and Mount Hope, showing the cost of operation, quantities of oil handled, and the unit cost.*

BALBOA.

Month.	Operating expense.				Quantity handled, barrels.	Unit cost, handling per barrel.	Value of oil received.	Total expenditures.
	Labor.	Material.	Other expense.	Total.				
1915.								
January	$476.74	$212.40	$346.70	$1,035.84	$74,445.71	$0.0139	$55,081.25	$56,117.09
February	697.70	235.39	330.75	1,263.84	99,835.84	.0127	286.22	1,550.06
March	526.54	242.21	693.08	1,461.83	137,276.69	.0106	54,347.22	55,809.05
April	640.97	272.67	1,026.03	1,939.67	174,566.08	.0111	56,142.46	58,082.13
May	703.58	173.49	801.46	1,678.53	77,067.73	.0218		1,678.53
June	710.00	268.12	1,251.22	2,229.34	166,829.57	.0134	54,068.74	56,298.08
Total	3,755.53	1,404.28	4,449.24	9,609.05	730,021.62	.0132	219,925.89	229,534.94
Average per month	625.92	234.05	741.54	1,601.51	121,670.27	.0132	36,654.31	38,255.82

TABLE No. 7.—*Abstract of expenditures, mechanical division, for fuel-oil plants Balboa and Mount Hope, showing the cost of operation, quantities of oil handled, and the unit cost*—Continued.

MOUNT HOPE.

Month.	Operating expenses.				Quantity handled, barrels.	Unit cost, handling, per barrel.	Value of oil received.	Total expenditures.
	Labor.	Material.	Other expense.	Total.				
1915.								
March	$404.73	$107.55	$155.63	$667.91	$88,208.82	$0.0076	$79,157.72	$79,825.63
April	337.14	110.44	235.11	682.69	10,455.77	.0653		682.69
May	298.67	83.43	256.66	638.76	27,333.58	.0234	16,050.06	16,688.82
June	405.50	97.69	380.43	883.62	8,560.64	.1032		883.62
Total	1,446.04	399.11	1,027.83	2,872.98	134,558.81	.0214	95,207.78	98,080.76
Average per month	361.51	99.78	256.96	718.25	33,639.70	.0214	23,801.94	24,520.19

NOTE.—Only the actual cost of current repairs are included in these figures; there are no reserves included for either structure or equipment or repairs, nor depreciation.

TABLE No. 8.—*Abstract of expenditures, mechanical division, for the operation of the foundry, Balboa shops.*

Metals.	July.	August.	September.	October.	November.	December.
Aluminum:						
Output ....pounds						
Unit cost						
Brass:						
Output ....pounds	7,051	14,361	12,376	13,682	1,879	4,330
Unit cost	$0.139	$0.132	$0.125	$0.128	$0.145	$0.143
Brass, hard:						
Output ....pounds			1,360		221	
Unit cost			$0.131		$0.156	
Brass, special:						
Output ....pounds	48					
Unit cost	$0.258					
Bronze:						
Output ....pounds	3,424	2,132	1,600	611	1,281	2,163
Unit cost	$0.234	$0.182	$0.181	$0.224	$0.196	$0.191
Bronze, hard:						
Output ....pounds			713	270		
Unit cost			$0.213	$0.235		
Bronze, smooth:						
Output ....pounds						
Unit cost						
Bronze, phosphorous:						
Output ....pounds	13	179	523	586		
Unit cost	$0.283	$0.181	$0.166	$0.157		
Copper:						
Output ....pounds		28		54	68	
Unit cost		$0.169		$0.150	$0.150	
Lead:						
Output ....pounds	39			48	1,048	
Unit cost	$0.077			$0.101	$0.074	
Metal, bearing:						
Output ....pounds						
Unit cost						
Metal, brazing:						
Output ....pounds			8		6	
Unit cost			$0.162		$0.156	
Metal, white:						
Output ....pounds			455			
Unit cost			$0.189			
Tin:						
Output ....pounds	27					
Unit cost	$0.569					
Total brass foundry:						
Output ....pounds	10,602	16,700	17,035	15,251	4,503	6,493
Patterns	73	17	70	42	51	46
Castings	3,205	1,370	1,754	2,474	1,022	1,201
Expenditures	$1,821.94	$2,305.49	$2,335.66	$2,061.70	$656.33	$1,031.53

TABLE No 8.—*Abstract of expenditures, mechanical division, for the operation of the foundry, Balboa shops*—Continued.

Metals.	July.	August.	September.	October.	November.	December.
Iron:						
Output..........pounds..	226,701	269,447	220,701	166,057	117,302	108,283
Unit cost	$0.050	$0.044	$0.041	$0.045	$0.046	$0.048
Patterns	112	139	105	74	86	113
Castings	6,739	5,744	9,913	2,382	2,588	2,798
Expenditures	$11,232.30	$11,758.90	$9,092.20	$7,443.08	$5,447.92	$5,153.94
Steel:						
Output..........pounds..	47,488	23,905	83,360	40,915	37,024	52,564
Unit cost	$0.121	$0.122	$0.067	$0.085	$0.085	$0.081
Patterns	23	21	25	10	51	18
Castings	324	398	903	700	1,078	531
Expenditures	$4,235.32	$2,927.31	$5,617.78	$3,467.64	$3,155.59	$4,269.14
Grand totals:						
Output..........pounds..	284,791	310,052	321,096	222,223	158,829	167,340
Patterns	208	177	200	126	188	177
Castings	10,268	7,512	12,570	5,556	4,688	4,530
Expenditures	$17,289.56	$16,991.70	$17,045.64	$12,972.42	$9,259.84	$10,454.61

Metals.	January.	February.	March.	April.	May.	June.	Total.
Aluminum:							
Output..........pounds..						29	29
Unit cost						$0.276	
Brass:							
Output..........pounds..	10,909	16,548	11,391	7,212	12,537	13,122	125,398
Unit cost	$0.134	$0.125	$0.127	$0.136	$0.124	$0.121	
Brass, hard:							
Output..........pounds..							1,581
Unit cost							
Brass, special:							
Output..........pounds..							48
Unit cost							
Bronze:							
Output..........pounds..	1,454	695	2,342	1,047	933	609	18,291
Unit cost	$0.176	$0.178	$0.179	$0.198	$0.179	$0.144	
Bronze, hard:							
Output..........pounds..	15						998
Unit cost	$0.406						
Bronze, smooth:							
Output..........pounds..		252					252
Unit cost		$0.163					
Bronze, phosphorous:							
Output..........pounds..	839		1,152		19	18	3,329
Unit cost	$0.162		$0.163		$0.269	$0.283	
Copper:							
Output..........pounds..			20				170
Unit cost			$0.181				
Lead:							
Output..........pounds..						168	1,303
Unit cost						$0.082	
Metal, bearing:							
Output..........pounds..			165	472			637
Unit cost			$0.226	$0.233			
Metal, brazing:							
Output..........pounds..	441	7	2,748		60		3,270
Unit cost	$0.142	$0.165	$0.137		$0.131		
Metal, white:							
Output..........pounds..							455
Unit cost							
Tin:							
Output..........pounds..			7		4		38
Unit cost			$0.614		$0.665		
Total brass foundry.							
Output..........pounds..	13,658	17,502	17,825	8,731	13,553	13,946	155,799
Patterns	49	43	51	10	20	24	496
Castings	1,306	874	2,054	727	838	1,747	18,572
Expenditures	$1,926.24	$2,233.06	$2,472.30	$1,414.23	$1,762.34	$1,715.00	$21,735.82
Iron.							
Output..........pounds..	82,326	114,640	114,402	107,467	101,397	163,592	1,792,315
Unit cost	$0.047	$0.037	$0.035	$0.036	$0.033	$0.030	
Patterns	64	83	33	39	22	55	925
Castings	1,983	2,181	2,430	2,295	1,819	2,588	43,460
Expenditures	$3,886.92	$4,292.08	$4,035.03	$3,913.50	$3,302.76	$4,864.31	$74,422.94

TABLE NO. 8.—*Abstract of expenditures, mechanical division, for the operation of the foundry, Balboa shops*—Continued.

Metals.	January.	February.	March.	April.	May.	June.	Total.
Steel:							
Output..........pounds..	27,260	57,495	77,568	59,995	73,735	43,800	625,109
Unit cost	$0.120	$0.086	$0.079	$0.090	$0.067	$0.084	....
Patterns	18	20	10	14	7	11	228
Castings	388	508	491	451	402	310	6,484
Expenditures	$3,284.50	$4,957.88	$6,091.17	$5,425.50	$4,947.82	$3,676.66	$52,056.31
Grand totals:							
Output..........pounds..	123,244	189,637	209,795	176,193	188,685	221,338	2,573,223
Patterns	131	146	94	63	49	90	1,649
Castings	3,677	3,563	4,975	3,473	3,059	4,645	68,516
Expenditures	$9,097.66	$11,483.02	$12,598.50	$10,753.23	$10,012.92	$10,255.97	$148,215.07

TABLE NO. 9.—*Number of repairs to locomotives during fiscal year, mechanical division.*

Month.	Running.	Heavy.	Total.
1914			
July	720	4	724
August	1,288	3	1,291
September	1,186	3	1,189
October	1,325	5	1,330
November	1,167	2	1,169
December	1,239	5	1,244
1915			
January	1,270	2	1,272
February	1,141	3	1,144
March	1,082	3	1,085
April	1,084	4	1,088
May	1,089	2	1,091
June	1,073	2	1,075
Total	13,664	38	13,702
Average per month this year	1,138.6	3.16	1,141.8
Average per month last year	1,700.2	5	1,705.2

TABLE NO. 10.—*Repairs made during fiscal year to equipment other than locomotives and cars, mechanical division.*

Month.	Cranes.	Track shifters.	Unloaders.	Spreaders.	Others.	Total.
1914						
July	15	....	6	2	2	25
August	15	1	....	4	3	23
September	14	....	....	5	2	21
October	26	....	1	4	1	32
November	20	....	....	....	1	21
December	26	....	5	4	3	38
1915						
January	24	....	....	8	3	35
February	38	1	1	3	6	49
March	37	1	....	6	4	48
April	28	....	4	6	3	41
May	31	....	2	12	1	46
June	22	....	....	19	3	44
Total	296	3	19	73	32	423
Average per month this year	24.67	0.25	1.59	6.08	2.66	35.25
Average per month last year	27.25	4.83	22.75	18.42	7.33	80.58

TABLE NO. 11.—*Number of shop and field repairs made to different classes of cars during fiscal year, mechanical division.*

Equipment.	Number of shop repairs.	Number of field repairs.	Total.
Lidgerwood flat cars	3,589	16,264	19,853
Steel dump cars	4,407	18,175	22,582
Labor cars	794	396	1,190
Steel flats	564	4,344	4,908
Miscellaneous	4,680	29,492	34,172
Total	14,034	68,671	82,705
Average per month this year	1,170	5,723	6,893
Average per month last year	833	9,752	10,585

TABLE NO. 12.—*Amount of equipment hostled and the cost, mechanical division.*

Month.	Hostlings.	Direct labor.	Surcharge.	Material and service.	Total cost.	Average labor.	Average total cost per hostling.
1914.							
July	5,564	$3,018.49	$1,726.32	$1,120.71	$5,865.52	$$0.54250	$1.0542
August	5,448	3,030.53	1,991.43	435.50	5,457.46	.55626	1.0017
September	4,970	3,118.34	2,491.80	1,263.03	6,873.17	.62743	1.3829
October	5,134	2,912.40	1,832.56	539.09	5,284.05	.56728	1.0292
November	5,330	2,815.30	1,676.97	469.09	4,961.36	.52820	.9308
December	5,495	2,791.54	1,708.62	370.12	4,870.28	.50802	.8863
1915.							
January	5,459	2,773.01	1,654.18	331.84	4,759.03	.50800	.8718
February	4,794	2,673.82	1,760.91	344.71	4,783.16	.55774	.9977
March	4,243	2,053.27	1,434.27	642.15	4,129.69	.48390	.9733
April	4,189	2,319.98	1,493.79	62.64	3,876.41	.55382	.9254
May	4,561	2,181.64	1,329.77	593.10	4,104.51	.47832	.8999
June	4,265	2,274.88	1,428.52	363.02	4,066.42	.53338	.9534
Total	59,452	31,963.20	20,529.14	6,535.00	59,031.06	.53763	.9929
Average per month this year	4,954	2,663.60	1,710.76	544.58	4,919.25	.53763	.9929
Average per month last year	5,010	3,125.56	1,586.32	768.59	5,480.47	.6239	1.0939

TABLE NO. 13.—*Expenditures and output of the oxyacetylene plant, Balboa shops, mechanical division.*

	Total expenditures.	Output of oxygen.	Output of acetylene.
1914.		*Cubic feet.*	*Cubic feet.*
July	$1,202.70	10,738	66,664
August	1,079.29	2,479	27,042
September	731.70	9,620	23,426
October	982.16	8,107	27,703
November	977.73	9,499	15,262
December	1,316.27	11,600	14,357
1915.			
January	1,538.09	10,100	19,180
February	1,194.84	14,200	14,609
March	1,182.42	15,500	20,278
April	1,463.59	18,400	21,387
May	1,430.76	14,000	20,091
June	1,510.18	19,950	16,758
Total	14,609.73	144,193	286,757

APPENDIX E.

REPORT OF THE MARINE SUPERINTENDENT, MARINE DIVISION.

Balboa Heights, Canal Zone, *July 15, 1915.*

Sir: The following report of the marine division is submitted for the fiscal year ending June 30, 1915:

On February 20, 1915, the designation of the division of canal transportation was changed to marine division and that of the superintendent of transportation to marine superintendent.

ORGANIZATION.

The organization remains practically the same as that originally proposed; the personnel has been materially increased, particularly in the number of pilots and boat crews. Nearly all of the tug and launch work and other marine service in the terminal ports which was formerly performed by other divisions has been taken over by the marine division.

CAPTAINS OF THE PORTS.

Commander D. E. Dismukes, United States Navy, was detailed as captain of the port of Cristobal, and Commander H. V. Butler, United States Navy, as captain of the port of Balboa. The captains of the ports, amongst their other duties, are charged with regulating and controlling canal and harbor traffic; entering, clearing, and measuring vessels; and levying tolls, disseminating information concerning sailing routes, and other marine matters. They have endeavored to make their offices the centers of information on all matters in relation to shipping and to lend their services in cooperating with other departments in the transaction of their shipping business.

OFFICE BUILDINGS FOR CAPTAINS OF THE PORTS.

It has been found necessary to have the offices of the captains of the ports centrally located with reference to the wharves and shipping interests. At both terminals they have occupied temporary accommodations, but it is recommended that permanent buildings be erected. These offices should be sufficiently commodious to accommodate the several other divisions which are conjointly interested in the shipping.

BRANCH HYDROGRAPHIC OFFICES.

In connection with the captains of the ports' offices at each end of the canal branch hydrographic offices have been established, where information is freely given in relation to steamer and sailing routes, weather, currents, charts, barometers, chronometer comparison, etc., and where charts of any part of the world may be purchased.

CONCENTRATION OF FORCE.

Under present working conditions the traffic of the canal requires that part of the field and office force be available from 6 a. m. until 10 p. m.; sometimes later. At the Pacific terminal in particular they are housed in widely separated localities, such as Ancon, Balboa, and Panama. In many cases the work is such that preliminary notice can not be given in time to have the force available to meet the demand, and it is therefore recommended that quarters be provided and grouped in a convenient locality near the captains of the ports' offices, so that the necessary force will be made readily available at all times. If the whole force on the Pacific side were quartered together, near the water front, fully an hour would be saved in getting vessels started from the outside anchorage in the morning.

DISSEMINATION OF INFORMATION OF USE TO SHIPPING.

Notices to Mariners are issued from time to time giving information in reference to changes in aids to navigation and other matters of interest to navigators; and Notices to Steamship Companies in reference to all matters concerning the transit of ships through the canal, such as tolls, measurements, services, prices, interpretations of the laws, rules and regulations, etc., as occasion may require. Full Sailing Directions for The Panama Canal and approaches thereto, together with other useful and necessary information, have been compiled and issued. New hydrographic charts of the canal and approaches are now available and on sale at the principal chart agencies and at the canal.

NAVIGATION OF THE CANAL—SLIDES.

Since the canal has been opened to navigation it has been clearly demonstrated that there is not the slightest difficulty for the largest ships to navigate it with ease and safety. Its free navigation has been somewhat obstructed by the slides in the Cut, which have sometimes caused delays, but with the canal at its designed size any vessel should be able to pass through from ocean to ocean in about eight or nine hours. The time of lockage has been very materially reduced.

To date but one shift has been kept for operating the locks, which would normally allow an eight-hour period for navigation, but by special detail the time of operation may be extended so that vessels may use the locks between the hours of 7 a. m. and 10 p. m.

With a material increase in trade, which may be expected at the conclusion of the European war, the operating force both in the marine division and at the locks will have to be increased.

PONTOON BRIDGE.

Owing to the fact that a train service must be maintained to the several Army posts on the west side of the canal, it has been necessary to continue the use of the pontoon bridge at Paraiso. This is an obstruction to navigation, and it is earnestly hoped that provision may be made by which the bridge may be discontinued.

AIDS TO NAVIGATION.

A few minor changes have been made in the aids to navigation in the canal, the principal one being the rearrangement of the beacons in the Cut in pairs, one opposite the other at all turns and in the middle of the long reaches. The characteristics of some of the lights have also been changed. A special appropriation of $40,000 was made by Congress for the establishment of lights on the Pacific side at Cape Mala and Bona Island; these lights are nearing completion. An additional light will be established at Taboguilla Island. The completion of all these lights will render the navigation of the Pacific approach to the canal a simple and easy matter. In point of fact there is hardly any body of water in the world better lighted and buoyed than The Panama Canal.

SIGNAL STATIONS AND COMMUNICATIONS.

Signal stations have been established at Gamboa and La Pita for the interior control of canal traffic and at the terminal ports for reporting and recording arrivals and departures. All stations are equipped for communicating with vessels by international code, and in addition the interior stations by special code using shapes. The ends of all of the lock approach walls have been equipped with a special signal apparatus for directing the movements of vessels for entering the locks.

A special telephone line for the control of canal traffic has been installed, which connects with the offices of the captains of the ports, locks, and signal stations; besides which they are all connected with the general telephone system. In addition to the above, close touch is kept with all vessels fitted with radio through the terminal radio stations both while in transit through the canal and when approaching or leaving the terminal ports. An intermediate temporary signal station is established at Cucaracha slide to control the movements of vessels in this vicinity during the time that the width of the channel may be constricted by the slides and dredging operations.

The matter of communicating with and controlling the movements of vessels is very satisfactory.

A complete record of the movements of all vessels in canal waters is kept by all stations sighting them.

MOORING STATIONS.

Mooring stations have been established at Gamboa and Empire; the former is permanent, and consists of mooring buoys and dolphins. The latter is only temporary, and consists of floats moored to the banks of the canal, with mooring posts on shore. These stations were made necessary on account of the slides, and in addition the former will be used when necessary to temporarily moor southbound vessels so that they may avoid passing others northbound in the Cut. The dolphin berth at Balboa has been extended and strengthened.

RADIO.

In addition to handling ships' business, the radio stations at the terminal ports send out daily news bulletins, time signals, and Notices to Mariners of interest to approaching vessels. Vessels approaching the canal are encouraged to send preliminary notice of their arrival and services required, by radio, so that their wants may be anticipated and attended to prior to their entering port.

FLOATING EQUIPMENT.

The tugs and motor boats for general service have been consolidated under the captains of the ports at the two terminals; two new tugs have been added, one at each end, and several new motor boats. An effort has been made to standardize the motor boats belonging to the canal, and with this end in view a type of boat and engine has been adopted. Several steam launches have been converted to motor boats, and many of the old boats have been repaired and standardized. A 50-foot motor boat has been purchased under the special lighthouse appropriation of $40,000 as a tender for Cape Mala and Bona Island lights.

MEASUREMENT OF VESSELS AND APPLICATION OF TOLLS.

The Panama Canal act, section 8, defines and sets forth the basis upon which tolls may be levied. In its application to commercial vessels it was interpreted by the board of admeasurers at the canal to mean their net tonnage as determined by the Panama Canal Rules of Measurement as promulgated by the presidential proclamation of November 21, 1913, and at the rates set forth in the presidential proclamation of November 13, 1912.

The Panama Canal Rules were challenged by the Pacific coast lumber interests, which advanced the claim that deck loads should be exempt from charges, on the grounds that only the equivalent of a vessel's United States net registered tonnage was subject to charges. On this being referred to the Attorney General of the United States, he decided that from the wording of the Panama Canal act—that the factor of United States net registered tonnage must be considered in reckoning and levying tolls—that tolls would continue to be levied on Panama Canal measurement at $1.20 per ton for loaded vessels, but that the amount collectible could not legally exceed the United States net registered tonnage multiplied by $1.25.

When the Panama Rules of Measurement were adopted, in order to save time at the canal and that owners and agents might know in advance the tonnage on which tolls would be levied, arrangements were made by which vessels could be measured and certificates be issued in the principal domestic and foreign ports. With so many different authorized measurers, and in view of the fact that any set of rules may leave some doubt as to their interpretation, many of the certificates received at the canal had to be checked and corrected, but this was not difficult and rarely caused any material delay, since their certificates showed the measured capacity of all spaces, and it was only a matter of correct classification on the part of the admeasurers at the canal to obtain the correct tonnage.

But after the canal had been in operation about six months, and the decision of the Attorney General was rendered that the United States net registered tonnage must be considered as a factor, it brought into the field a second set of rules pertaining to it which, taken in conjunction with the first, leads to no end of additional work, misunderstandings, complications, and correspondence and claims, and makes the correct and accurate determination of the exact amount of tolls to be levied almost impossible. In fact, from a commercial or business standpoint, where settlements should be promptly effected, the present conditions are all but chaotic, and have led to no end of just claims on the part of the shipping interests which will not only be difficult to settle, but will result in a long delay to them before the balance due will be finally recovered.

In their present form, the rules for the determination of United States net registered tonnage are not a fit basis for levying tolls for The Panama Canal; they are sadly in need of revision.

Not the least of the confusion which arises in the consideration of the two factors is due to the fact that the same space is liable to a different classification and treatment under the two sets of rules, and that under the United States rules owners have options in the classification of certain spaces.

The amount of tolls levied, it is needless to add, is dependent upon the classification, exemption, and deductions of the various spaces on board ships.

The introduction of this second factor also opens the door to the application of a number of laws which bear directly upon the determination of United States net registered tonnage, which, when applied, allow a very material variation in arriving at the net tonnage of certain classes of vessels, so much so, in fact, that under certain conditions three vessels built on exactly the same lines might all have a different official net registered tonnage, and pay different tolls at the canal. When these laws were passed, not realizing that they would affect Panama Canal tolls, no consideration was given to this subject, with the result that they not only invariably decrease the tolls, but also authorize such a variation in the determination of United States net registered tonnage, or its equivalent in foreign vessels, that it actually discriminates in favor of or against certain classes of vessels. And in the same way it authorizes particular classes of vessels to optionally take advantage of certain privileges in the classification and exemption of space, which gives them a decided advantage over others less favored. This is particularly true of foreign-built vessels, which, under the act of Congress approved August 18, 1914, may be admitted to registration under the American flag without remeasurement and retain their original foreign net tonnage. It might be noted that this act was passed about the time that the canal was opened to traffic, and before the Attorney General's decision was rendered, and that no consideration was given to its bearing on canal tolls or the discrimination in favor of or against American or foreign vessels which results from its passage. One illustration will suffice: The steamship *Charlton Hall*, which passed through the canal June 29, 1915, was formerly a British ship, and was admitted to United States registration December 31, 1914, under the above-mentioned act, retaining her original national registered net tonnage of 2,999.51 tons. Had this vessel been remeasured according to the United States rules in vogue at that time, her net tonnage would have been 4,168.11 tons, a difference of 1,168.60 tons, equivalent in tolls to $1,402.80, which are now lost to the canal.

This discrimination in favor of this vessel and other similar cases is a clear violation of the Hay-Pauncefote treaty, which stipulated that there should be no discrimination in favor of the vessels of any nation, and should, therefore, be rectified by Congress in conjunction with other necessary legislation in reference to Panama Canal tolls.

The Commissioner of Navigation acting under his prerogative, on March 16, 1915, caused to be issued a circular in reference to the exemption from measurement, under certain conditions, of shelter-deck and closed-in spaces on board ships, which had previously been subject to measurement and charges for Panama Canal tolls.

It is thus apparent that as long as this holds true, and the United States net registered tonnage must still be considered as a factor in determining Panama Canal tolls, that the Commissioner of Navigation, in reference to this factor, is empowered to arbitrarily decide which spaces in United States vessels shall or shall not be subject to measurement and tolls, and exercises a power which is similar to that vested in Congress and the President in reference to the other factor, namely, the Panama Canal Rules of Measurement.

Another point in this connection is the fact that while the board of admeasurers at the canal decides all questions in relation to Panama Canal tolls, the Commissioner of Navigation in Washington is the final authority on deciding those relating to United States tonnage. It is needless to point out the utter impossibility of prompt administrative action where matters in dispute must be referred to two separate, independent, and distinct heads so widely separated. There can be no question but that there should be but one head, and that at the point of administration at the canal, for the settlement of all claims and disputes.

In reference to the above-mentioned circular of the Commissioner of Navigation, its effect on Panama Canal tolls will result in a heavy loss, and while sufficient data are not available for an accurate determination, it may be assumed that this, and the consideration of the factor of United States net registered tonnage combined, will result in a reduction of fully 15 per cent of what would otherwise have been collected.

There are other inconsistencies which enter into the determination of United States net registered tonnage of vessels under this decision of the Commissioner of Navigation and United States regulations which offer grounds for discrimination in cases of vessels of certain types. It can easily be shown that vessels may doubly profit in gaining exemption from tolls by carrying bunker coal in this exempted shelter deck or closed-in space, without charges and yet obtain a still further advantage in the deduction of bunker space, and hence charges for tolls, under a different rule, even though such total amount of bunker space does not exist. In other words, advantage is taken of one rule to still further profit by another to reduce the amount of space on which tolls may be levied. To give a concrete example: In reference to the Commissioner of Navigation's circular of March 16, 1915, and as a matter of equity, granting equal privileges to foreign vessels, in the cases of vessels which recently transited the canal, the steamship *Aboukir* had a bridge space amounting to approximately 337 tons, which, as a matter of equity, would be exempt from measurement and tolls under this circular. The steamship *Tottori Maru* had a bridge space of approximately the same size as the *Aboukir*, which would be exempt from measurement and which was filled with coal. In both cases the said spaces were easily and readily made water-tight and could have carried freight thoroughly protected, which, had the circular not been issued, would have been subject to measurement and tolls. The *Aboukir* was allowed a propelling power deduction of 32 per cent of her gross tonnage and the steamship *Tottori Maru* a deduction of 175 per cent of the propelling power space.

Since these ships, and others of this type, carry a large percentage of their bunker coal in the exempted bridge space, thereby necessitating smaller bunkers below, and having available a greater space for cargo, an exemption of this space gives them an undue advantage over ships of other types, and will result in discriminations in their favor. Other instances can be cited to show the inconsistencies of the United States rules of measurement as a basis for assessing Panama Canal tolls, and as long as they must be considered a factor they will lead to no end of confusion and discrimination, which will all be avoided if the Panama rules alone be adopted.

So far as commercial vessels are concerned that use the canal, they may be divided into three classes: (*a*) Those built and registered in the United States; (*b*) those built abroad but admitted to United States registration under their original foreign measurement and tonnage in accordance with the act of Congress of August 18, 1914; and (*c*) foreign vessels not admitted to United States registration. In accordance with existing laws and equity, on the arrival of these vessels at the canal, in the matter of levying tolls and computing the factor of United States net registered tonnage or its equivalent, these three classes may be measured each on a different basis from the others, in which, without going into details, the foreign-built vessels will generally have an advantage over those which were built in the United States.

Before the Panama Canal Rules of Measurement were adopted an expert had been employed by the Government to go into the question of the measurement of vessels and the application of tolls for The Panama Canal, and the net result of which was shown in the presidential proclamations of November 13, 1912, and November 21, 1913, which promulgated the rules and rates of tolls. At the same time it is assumed that the assistance of this expert was utilized in drafting the act of Congress which put into operation these rules and tolls, and it is evident that the proper care and vigilance was sadly neglected in framing either the act or the rules which admitted United States net registered tonnage as a factor to be jointly considered with Panama Canal measurement for the determination of tolls to be applied. Under no condition should a double basis be considered as at present, nor should United States net registered tonnage be made the basis unless the present laws which are applicable to it, and the rules themselves, be revised and placed in such a shape that all vessels to be measured under them and assigned a tonnage may be measured alike, according to class and type, and without discrimination.

The Panama Canal Rules of Measurement, taken alone with no dependent factor, are made to apply to all vessels alike, without discrimination as to kind, type, class, or nationality, and are excellent for their purpose, and it is strongly recommended that Congress be requested to eliminate the factor of United States net registered tonnage and base the measurement and tolls solely upon the Panama Canal Rules of Measurement as laid down in the above-mentioned presidential proclamations.

ADJUSTMENT OF CLAIMS.

It is all but needless to add that the conditions mentioned under which tolls have been and must still be levied have given rise to no end of claims and to a number of conditions which will have to be settled and rectified.

In August, 1914, on the opening of the canal, only the Panama Canal rules were considered. In March, 1915, the Attorney General's decision made it necessary to consider the factor of United States net registered tonnage. Had these been the only considerations, had the United States rules of measurement been well conditioned for levying tolls, had there been no changes made in them, and had there been some provision by which all foreign ships of every nation would have been subject to identically the same rules as American shipping, it might not have given rise to so many claims and adjustments, but such was not the case. Immediately upon the receipt of the Attorney General's decision the second factor was put into practice, and being retroactive in its application many of the vessels which had already used the canal filed a claim for the resulting differences. A study of the United States rules leads to that of the laws bearing upon them, and hence directs attention to the act of Congress of August 18, 1914, and the presidential proclamation of September 4, 1914, which substantially admits foreign vessels to United States registration on application, without remeasurement and with their original foreign net registered tonnage.

In spite of the fact that a circular (No. 240) of September 21, 1914, of the Department of Commerce states that "the measurement laws of the United States and the principal maritime nations are substantially the same," it has not been found so at the canal in the administrative application of tolls; on the other hand, there are many differences. So different were they, in fact, when this circular was issued that under the United States rules shelter deck and closed-in space, under certain conditions, was measured and added to a vessel's net tonnage and both tonnage dues and tolls were levied on it; yet under the British law this same space would be exempted. This is far from being a small item, and not infrequently amounts to over 1,000 tons in a single vessel, or $1,200 in tolls.

Claim was made for refund of tolls on the Norwegian steamer *Arna* and the British steamer *Wray Castle*. The *Arna* passed through the canal in October, 1914; her foreign net registered tonnage is 3,249, her equivalent United States net tonnage, 4,630, a difference of 1,381 tons. The *Wray Castle* passed through in March, 1915; her foreign registered net tonnage is 2,717, her equivalent United States net tonnage, 4,133, a difference of 1,416 tons.

Then, on March 16, 1915, the Commissioner of Navigation issued a circular withdrawing this shelter deck and closed-in space, under certain conditions, from measurement, and hence from inclusion in United States net registered tonnage and for levying tolls. This subsequent action on his part, to my mind, appears to be for the purpose of making the United States rules of measurement more nearly conform to those of foreign nations. The effect on Panama Canal tolls was not only to greatly decrease them, but adds all the more confusion to the settlement of claims.

Had it been known in advance that both sets of rules would apply, and that these several laws and the circulars from the Commissioner of Navigation would also be applied, as vessels presented themselves, tolls could have been levied approximately correct. I say approximately, because there are still a number of questions arising out of these interpretations which still remain to be settled, not the least of which are those involving discrimination. As before stated, under this mass of confusion as to the measurement and classification of space, identical vessels may present themselves for transit, and in accordance with the present laws, be assessed different amounts of tolls. When rules are clear and distinct and admit of no doubt as to their interpretation the mere measurement and classification of space is a fairly simple matter. But unfortunately many of the vessels which passed through in the first six months after the opening of the canal have not returned, nor may ever do so, and since at the time no thought was given to the necessity of obtaining their United States net registered tonnage or its equivalent, without a personal inspection and remeasurement of these vessels, it will be difficult to arrive at an absolute correct basis for settlement; more particularly if they be remeasured elsewhere, errors are liable to enter.

Many of the claims submitted are based upon a misunderstanding of the laws and rules for measurement; in fact, the resultant confusion has not only been directed toward the recovery of overpaid tolls, but an effort on the part of shipping interests, at home and abroad, to acquaint themselves with conditions as they actually exist. It is not as if all interests were centered where inquiries could be made and answered at once, and action be taken accordingly, but information is being constantly solicited by correspondence which requires an immediate reply, but which is frequently delayed owing to the distance to and from the canal and the slowness of the mail.

Another unfortunate feature in the matter of claims is due to the fact that before most of the early claims were presented, all money collected for tolls was converted into the Treasury, and the slow process of law will have to be followed before it can be recovered under congressional appropriation.

A very essential feature of all business is the necessity of knowing in advance all conditions and contingencies which may arise, including costs and methods to be followed. This is particularly so in shipping circles, where plans are always made well in advance, and costs considered, and the exact amount of tolls at the canal, and method of handling deposits and other transactions should be definitely and accurately determined and known. It is for this reason, amongst others, that steps should be taken at the earliest possible date to put into execution a set of rules that will admit of no matter of doubt, and be just and equitable for everyone concerned.

Every effort has been made on the part of the canal to disseminate all information of interest to shipping by the publication and distribution of circulars bearing on the subject, yet there are never-ending inquiries and claims in individual cases, most of which arise from the condition of the laws, rules, and regulations which pertain to the payment of tolls.

AGENCIES.

Experience has fully demonstrated that the interests of vessels using the canal for transit and purchase of coal, supplies, provisions, and attendant services are much easier, better, and satisfactorily handled when placed in the hands of the canal authorities than when in the hands of local agents. In this respect, as well as in others, every effort has been made to eliminate any unnecessary or duplication of work and to make our business methods as simple as possible. To such an extent has this been accomplished that if owners or agents will follow our advice a vessel may automatically enter and pass through the canal without her master leaving his ship or signing a paper.

TRADE ROUTES—REVENUES.

The opening of The Panama Canal has fully demonstrated the predictions made for it, that it would establish new trade routes and alter old ones; this is abundantly verified. It is interesting to note the coastwise trade that almost at once sprung up between the east and west coasts of the United States, and it is showing a healthy increase. Another interesting point is in the number of sailing vessels which utilize the canal in both directions.

In the first year, in spite of the European war, it more than paid operating expenses, with every indication that its trade will increase, and while it may not for some years yield a fair percentage on the original investment, it will earn a very appreciable revenue over and above expenses of operation and maintenance and prove its inestimable value to the Government in other ways.

The following table shows the number of vessels and the general trend of traffic through the canal from August, 1914, up to and including June 30, 1915.

NUMBER OF VESSELS FROM ATLANTIC TO PACIFIC.

Month.	United States coastwise.	United States to South and Central America.	United States to Far East, including Australia.	Europe to west coast of United States and Canada.	Europe to South and Central America.	Miscellaneous.	Ballast.	Total.
August	9	....	1	....	....	....	3	13
September	14	3	4	1	1	....	4	27
October	14	4	9	3	2	1	11	44
November	20	6	11	3	2	5	7	54
December	16	6	11	2	3	3	2	43
January	18	7	7	4	4	3	1	44
February	10	4	11	3	8	....	3	39
March	17	10	8	4	10	2	6	57
April	17	8	10	5	8	1	10	59
May	22	10	13	2	7	1	12	67
June	15	21	17	4	7	3	16	83
Total	172	79	102	31	52	19	75	530

NUMBER OF VESSELS FROM PACIFIC TO ATLANTIC.

Month.	United States coastwise.	South and Central America to United States.	Far East, including Australia, to United States.	West coast of United States and Canada to Europe.	South and Central America to Europe.	Miscellaneous.	Ballast.	Total.
August	6	2	....	2	....	....	1	11
September	9	10	....	6	....	1	4	30
October	21	2	....	14	3	....	....	40
November	14	9	....	12	2	1	....	38
December	18	8	2	17	8	....	4	57
January	11	14	....	11	13	....	5	54
February	15	12	1	14	11	....	....	53
March	20	20	3	16	13	3	5	80
April	12	16	3	6	16	1	6	60
May	19	17	6	8	21	2	2	75
June	18	17	1	5	16	....	3	60
Total	163	127	16	111	103	8	30	558

TOTAL NUMBER OF VESSELS TRANSITING THE CANAL.

United States coastwise	335
Between United States and South and Central America	206
Between United States and Far East, including Australia	118
Between Europe and west coast of United States and Canada	142
Between Europe and South and Central America	155
Miscellaneous	27
Ballast	105
Total	1,088

The following appendices are subjoined to this report: (1) Annual report of the board of admeasurers. (2) Annual report of the board of local inspectors. (3) Analysis of trade routes.

Respectfully,

Hugh Rodman,
Marine Superintendent.

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

APPENDIX 1 TO APPENDIX E.

REPORT OF THE CHAIRMAN, BOARD OF ADMEASURERS, DEPARTMENT OF OPERATION AND MAINTENANCE.

Balboa Heights, Canal Zone,
July 15, 1915.

Sir: The following report of the board of admeasurers is submitted for the fiscal year ending June 30, 1915:

All matters relating to the measurement of vessels and the resulting levying of tolls are referred to the board of admeasurers. It consists, ex officio, of the marine superintendent as chairman, the two captains of the ports as members, and a recorder.

All certificates of measurement, no matter in what form, whether they be Panama Canal or United States or foreign registers, are checked on presentation at the Isthmus, and all information in relation thereto is recorded and filed.

Every effort has been made to systematize the measurement and simplify the work in connection therewith, and particularly to instruct all official measurers at home and abroad in any points of difference which have arisen with the end in view of standardizing and making the work as nearly uniform as possible. With the Panama Canal rules only to be considered, this would soon have been accomplished, but the introduction of the factor of United States net registered tonnage, as explained somewhat at length in the annual report of the marine superintendent, has made the prompt, exact, and precise administration of the measurement rules all but impossible.

The recommendation to remedy the existing difficulties, to put the rules of measurement on a firm and simple foundation, and do away with the discrimination which enters under the present system, is fully covered in the report of the marine superintendent under the heading, "Measurement of vessels and application of tolls."

Respectfully,

Hugh Rodman,
Chairman, Board of Admeasurers.

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

APPENDIX 2 TO APPENDIX E.

REPORT OF THE CHAIRMAN, BOARD OF LOCAL INSPECTORS, DEPARTMENT OF OPERATION AND MAINTENANCE.

Balboa Heights, Canal Zone,
July 1, 1915.

Sir: I have the honor to submit herewith report of the operations of the board of local inspectors for the fiscal year ending June 30, 1915, as required by section 13 of the rules and regulations governing the board, revised as of May 1, 1914, under circular No. 644.

Organization and personnel.—The organization of the board remains the same as during the previous fiscal year. No changes have been made in its personnel.

Navigation laws, etc.—Under date of May 15, 1915, Governor's circular No. 644–2, superseding circular No. 644–1, was issued amending paragraph 30 of circular No. 644, making a fee of $1 for the inspection of row or sail boats, and pangas equipped with detachable motors.

Accidents and investigations.—The following marine accidents of a serious nature occurred during the year:

On July 20, 1914, an explosion occurred in Gaillard Cut, resulting in the sinking of drill barge *Teredo*. An investigation by the board showed that the barge was sunk by a premature explosion of dynamite in the holes that were being loaded from the barge, and no blame was attached to any of the crew of the barge or neighboring craft.

On November 14, 1914, dump scow *No. 136* sustained damages in Gaillard Cut on account of being run into by the tug *Empire*. Upon hearing the statement of Mr. Chas. Melene, who was in charge of the tug at the time, and who stated that he had not been strictly observing the rules of the road, the board recommended that the Governor write him a letter of reprimand.

On February 22, 1915, barge *No. 28* was sunk at Gamboa. The board made an investigation and found that the sinking was due to the filling of rudder compartment from a leak in the rudder casing. It was found that after the barge was loaded and secured for the night, proper inspections were not made, and it was the opinion of the board that Mr. E. R. Parsons, master of dredge *No. 82*, was responsible for not having these inspections made, and was therefore responsible for the sinking of the barge. However, considering the mitigating circumstances, the board recommend clemency in dealing with the case.

On February 9, 1915, the schooner *Blanche E. Pendleton* was wrecked at Coco Solo Point, Limon Bay. After investigation the board was of the opinion that the responsibility rested with the master of the schooner, due to an error in judgment, and the refusal of assistance of a tug which was sent out in the morning of the 9th.

On May 4, 1915, a fire occurred on the American-Hawaiian steamship *Pennsylvanian*, while at sea. The board made an investigation on May 11, 1915, and was of the opinion that the fire was caused by the accidental bursting of a defective union in a fuel-oil line, and no responsibility was attached to any person.

Steamboat inspection.—The following table shows the number of vessels inspected and certificated during the year:

Over 100 gross tons	14
From 15 to 100 gross tons	4
Less than 15 gross tons	77
Total	95

Under the provisions of circular No. 371, dated January 28, 1911, inspections of all floating equipment were made, and equipment in need of general repairs was inspected throughout the year.

On floating equipment belonging to The Panama Canal and Panama Railroad, 81 boilers were inspected, and reports thereon rendered to the divisions interested.

During the year the board made appraisals of floating equipment for sale or transfer, as directed by the Governor or requested by the surveying officer.

Licenses issued.—A total of 120 licenses were issued to marine officers, as follows:

	Total.	Original.	Renewal.
Pilots	33	30	3
Masters	13	13	0
Mates	28	25	3
Engineers	46	42	4
Total	120	110	10

Attached hereto is a classified statement of officers licensed, showing in detail the grade of the various licenses issued.

Chauffeurs.—A total of 203 chauffeurs' licenses were issued during the year; of this number 195 were originals and 8 were duplicates issued on account of loss of originals. There were also issued 4 licenses as operator of motor fire engines and 4 as operator of motor buses.

Navigators of motor boats.—There were issued a total of 79 licenses to operators of motor boats; of this number 77 were original licenses and 2 were duplicates.

Licenses refused.—Marine licenses, 14; navigators of motor boats, 49; chauffeurs, 45; operators of fire engines, 1. Total licenses refused, 109.

Detailed statement of officers' licenses issued by the board of local inspectors during the fiscal year 1914–15.

To masters of towboats	3
To masters of ladder dredges	1
To masters of suction dredges	2
To masters of dipper dredges	5
To chief and second engineers of towboats	3
To chief, second, and third engineers, all dredges	42
To all engineers of ships of any tonnage	1
To mates of towboats	4
To mates of dredges, all classes	24
To pilots of towboats	1
To pilots of passenger and cargo steamers, any tonnage	32
To masters, unlimited tonnage	1
To masters, R. de P. steamship *San Blas* (special)	1
Total licenses issued	120

Respectfully,

D. E. Dismukes, *Chairman of the Board.*

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal, Balboa Heights, Canal Zone.
(Through the Marine Superintendent).

APPENDIX 3 TO APPENDIX E.

ANALYSIS OF TRADE ROUTES.

[Prepared by Canal Record statistician and published in Canal Record Aug. 4, 1915.]

TRAFFIC FOR FISCAL YEAR—NEARLY 5,000,000 TONS OF CARGO THROUGH THE CANAL—OVER $4,424,000 IN TOLLS—ANALYSIS OF TRAFFIC.

At the close of business on June 30, 1915, was completed the fiscal year which included all of the period during which the canal has been opened to commercial traffic of oceangoing ships. This period, from August 14 to July 1, was 10½ months, or seven-eighths of a calendar year.

During the period the canal was used by 1,088 vessels, having aggregate gross and net tonnage of 5,416,787 and 3,843,035 tons, respectively, Panama Canal measurement, and carrying a total of 4,969,792 tons of cargo.

The movement of 4,969,792 tons of cargo in the period, or 10½ months, is at the rate of 5,679,762 tons in a full calendar year, or 473,313.5 tons per month, or 15,530.6 tons per day.

A summary of the numbers of vessels passing through the canal in each direction and the tons of cargo handled, by months, since the opening of the canal to commercial traffic (not including the barge traffic prior to Aug. 15) is given in this table:

Month.	Eastbound.		Westbound.		Total.	
	Vessels.	Cargo, tons.	Vessels.	Cargo, tons.	Vessels.	Cargo, tons.
August	13	49,106	11	62,178	24	111,284
September	27	141,762	30	180,276	57	322,038
October	44	168,069	40	253,288	84	421,357
November	54	206,510	38	242,291	92	448,801
December	43	179,235	57	271,219	100	450,454
January	44	208,082	54	240,925	98	449,007
February	39	150,987	53	276,078	92	427,065
March	57	217,447	80	417,610	137	635,057
April	59	237,384	60	285,457	119	522,841
May	67	246,534	75	332,174	142	578,708
June	83	320,619	60	282,561	143	603,180
Total	530	2,125,735	558	2,844,057	1,088	4,969,792

More elaborate classifications, showing the number of vessels, their gross and net canal tonnage, and the cargo carried by them through the canal each month in each direction, are appended to this article.

TRAFFIC ROUTES.

Vessels without cargo passing through the canal in the period numbered 105.

Of the 983 vessels which were laden, all but 27 were plying over the five following great trade routes: The coastwise route of United States trade; a route between Europe and the west coast of the United States and Canada; a route between Europe and South and Central America; one between the Atlantic coast of the United States and the Pacific coast of South and Central America; and one between the United States and Australia, New Zealand, and the Far East. These routes were used by nearly 97 per cent of the vessels carrying cargo. The monthly traffic over each of them is presented in tabulation. The 3 per cent of loaded vessels which were not plying over these routes consisted principally of naval auxiliaries carrying coal to undetermined distinations, fishing vessels, and several vessels carrying lumber and sugar over unusual routings.

The United States coastwise route was used by 335 vessels, with total net tonnage of 1,305,291, carrying 1,846,658 tons of cargo. With reference to the total traffic, both laden and ballast vessels, this was 30.7 per cent of all vessels using the canal, 36.5 per cent of the net tonnage, and 37.1 per cent of the cargo.

The route between Europe and the west coast of the United States and Canada was used by 142 vessels (13.05 per cent of all), with net tonnage of 528,079 tons (13.7 per cent of all), carrying 834,899 tons of cargo (16.8 per cent of all).

Traffic between Europe and South and Central America, including those vessels plying between the Atlantic terminus of the canal and west coast ports, which carried cargo moving between Europe and South and Central America, engaged 155 vessels (14.2 per cent), with net tonnage of 428,224 (11.14 per cent), carrying 503,672 tons of cargo (10.13 per cent).

Traffic between South and Central America, including likewise the vessels terminating their voyages at one of the canal ports, but moving their cargo over this route, engaged 206 vessels (18.93 per cent), with net tonnage of 707,463 (18.4 per cent), carrying cargo amounting to 947,871 tons (19.07 per cent).

The route between the Atlantic seaboard of the United States and the Far East, including Australia and New Zealand, engaged 118 vessels (10.84 per cent), with net tonnage of 488,517 (12.7 per cent), carrying 725,712 tons of cargo (14.8 per cent).

The vessels without cargo or in ballast numbering 105 had an aggregate net tonnage of 306,086. This was 9.65 per cent of all vessels and 7.96 per cent of the entire net tonnage.

The average cargo of the laden vessels was 5,055.7 tons. The average of cargo among all the 1,088 vessels, laden and in ballast, was 4,567.8 tons.

BARGE TRAFFIC.

The first handling of cargo through the canal was begun on May 18, 1914, with the towing of barges loaded with sugar, and this traffic was continued intermittently until August 15, when the regular commecial traffic of through ships began.

The barge traffic between June 30, 1914, and August 15 may be summarized as follows:

	Atlantic to Pacific.		Pacific to Atlantic.		Total.	
	Number barges.	Cargo carried.	Number barges.	Cargo carried.	Number barges.	Cargo carried.
July	15	4,410	9	1,400	24	5,810
August	5	1,600	4	1,000	9	2,600
Total	20	6,010	13	2,400	33	8,410

The tolls levied in July, 1914, amounted to $7,598.40, all on barges. The tolls on barges in August were included with those on the oceangoing ships, the aggregate being $88,401.80.

The tolls on the barge traffic are carried as part of the receipts during the fiscal year, but in the consideration to be given the traffic through the canal the cargo handled in barges will not be considered. Including the barge traffic the total tonnage of cargo handled through the canal during the fiscal year was 4,977,882 tons; without the barge traffic, that is, since August 14, 1914, it was 4,969,472 tons. From this it is seen that the barge traffic is less than one-fifth of 1 per cent of the total traffic since the discontinuance of barge service. And as the conditions of operation were so different, consideration of the barge traffic would be out of place in arriving at averages in the consideration of the regular commercial traffic.

COMMODITIES.

The principal commodities passing through the canal, with the quantities moving in each direction, from August 14 to July 1, were as follows:

	Atlantic to Pacific.	Pacific to Atlantic.	Total.
	Tons.	*Tons.*	*Tons.*
Nitrates	411	651,537	651,948
Sugar	21,088	277,776	298,864
Coal	279,064	7,500	286,564
Petroleum, refined	220,229	32,199	252,428
Wheat	7,533	222,689	230,222
Barley	....	204,751	204,751
Manufactured goods of iron and steel	196,234	5,968	202,202
Lumber	2,325	179,341	181,666
Iron ore	2,200	83,904	86,104
Railroad material	56,106	....	56,106
Flour	3,811	50,283	54,094
Copper	2,810	46,989	49,799
Cotton, raw	44,781	4,065	48,846
Canned goods	6,955	40,043	46,998
Machinery	32,788	954	33,742
Oils, crude	3,731	26,863	30,594
Tin	24,280	6,304	30,584
Coffee	2,718	27,168	29,886
Manufactured goods, miscellaneous	24,990	2,011	27,001
Cacao	203	26,725	26,928
Wool	5	24,531	24,536
Cement	22,637	....	22,637
Iron	21,198	....	21,198
Copper ore	....	20,740	20,740
Coke	20,444	....	20,444
Vegetable oils	5,221	13,396	18,617
Textiles	15,647	1,075	16,722
Wines	686	12,537	13,223
Creosote	12,851	....	12,851
Chemicals	10,302	1,909	12,211
Skins and hides	3	11,360	11,363
Rice	1,037	8,643	9,680
Wire fencing	8,536	....	8,536
Seed	23	7,160	7,183
Beans	237	6,877	7,114

The total of the foregoing is 3,056,382 tons, which is 61½ per cent of the total cargo, 4,969,792 tons, passing through the canal to July 1. The cargo listed as "general cargo" and the foregoing together constituted over seven-eighths of the total traffic. The remaining eighth was made up to about 100 various commodities.

NATIONALITIES.

Vessels of 15 nations passed through the canal in the period under consideration. According to nationality, the American vessels led in number, being 471, only 7 more than the 464 British. Vessels of other nations using the canal were, in the order of their numbers: Norwegian, 41; Chilean, 35; Danish, 24; Swedish, 18; Dutch, 7; Japanese and Russian, 6 each; Peruvian, 4; French and Honduran, 3 each; Italian, Nicaraguan, and Panaman, 2 each. A table showing the numbers by months is given below.

Number of vessels of various nationalities passing through The Panama Canal.

ATLANTIC TO PACIFIC.

Month.	American.	British.	Chilean.	Danish.	Dutch.	French.	Honduran.	Italian.	Japanese.	Nicaraguan.	Norwegian.	Panamanian.	Peruvian.	Russian.	Swedish.	Total.
August	12	....	....	....	....	....	....	....	....	....	....	....	1	....	....	13
September	13	13	....	....	1	....	....	....	....	....	....	....	....	....	....	27
October	15	27	....	1	....	....	....	....	....	....	1	....	....	....	....	44
November	25	26	....	1	....	....	....	....	....	1	....	....	1	....	....	54
December	20	18	2	....	1	....	....	....	1	....	1	....	....	....	....	43
January	26	10	2	2	1	....	....	....	....	....	1	....	....	1	1	44
February	18	15	2	2	....	....	....	....	....	....	....	....	....	1	1	39
March	25	24	3	1	....	....	1	1	....	....	....	....	....	1	1	57
April	25	25	2	....	1	....	1	....	....	....	2	....	....	1	2	59
May	29	25	2	3	1	....	....	....	....	....	4	....	....	1	2	67
June	25	42	3	1	....	2	....	....	3	....	7	....	....	....	....	83
Total	233	225	16	11	5	2	2	1	4	1	16	....	2	5	7	530

Number of vessels of various nationalities passing through The Panama Canal—Contd.

PACIFIC TO ATLANTIC.

Month.	American.	British.	Chilean.	Danish.	Dutch.	French.	Honduran.	Italian.	Japanese.	Nicaraguan.	Norwegian.	Panamanian.	Peruvian.	Russian.	Swedish.	Total.
August	9	....	....	2	....	....	....	....	....	....	....	....	....	....	....	11
September	10	16	....	....	....	....	....	....	....	....	4	....	....	....	....	30
October	22	17	....	....	....	....	....	....	....	....	....	....	....	....	1	40
November	19	16	....	1	....	....	....	....	....	1	....	....	....	....	1	38
December	23	31	3	....	....	....	....	....	....	....	....	....	....	....	....	57
January	20	23	2	2	1	....	....	....	....	....	4	1	....	....	1	54
February	21	25	3	2	....	....	....	....	....	....	2	....	....	....	....	53
March	33	29	4	4	....	1	....	....	....	....	5	....	....	....	3	80
April	22	27	2	....	....	....	....	....	1	....	4	1	1	....	2	60
May	31	31	2	2	....	....	....	1	....	....	5	....	....	1	3	75
June	28	24	3	....	1	....	1	....	1	....	1	....	1	....	....	60
Total	238	239	19	13	2	1	1	1	2	1	25	2	2	1	11	558
Grand total	471	464	35	24	7	3	3	2	6	2	41	2	4	6	18	1,088

Summary of traffic through The Panama Canal since its opening to commercial traffic.

Month.	Atlantic to Pacific.				Pacific to Atlantic.			
	Vessels.	Canal tons.		Cargo tons.	Vessels.	Canal tons.		Cargo tons.
		Gross.	Net.			Gross.	Net.	
August	13	58,233	41,931	49,106	11	62,049	44,047	62,178
September	27	151,878	109,684	141,762	30	151,568	111,375	180,276
October	44	240,925	174,472	168,069	40	220,179	153,744	253,288
November	54	247,479	172,825	206,510	38	205,071	149,906	242,291
December	43	204,776	145,676	179,235	57	280,896	198,618	271,219
January	44	239,486	169,228	208,082	54	251,085	177,984	240,925
February	39	209,822	147,339	150,987	53	245,522	175,523	276,078
March	57	269,901	187,568	217,447	80	405,380	288,416	417,610
April	59	279,139	199,213	237,384	60	290,738	205,326	285,457
May	67	343,701	240,098	246,534	75	360,104	252,252	332,174
June	83	412,525	296,694	320,619	60	286,330	201,116	282,561
Total	530	2,657,865	1,884,728	2,125,735	558	2,758,922	1,958,307	2,844,057

Month.	Total.			
	Vessels.	Canal tons.		Cargo tons.
		Gross.	Net.	
August	24	120,282	85,978	111,284
September	57	303,446	221,059	322,038
October	84	461,104	328,216	421,357
November	92	452,550	322,731	448,801
December	100	485,672	344,294	450,454
January	98	490,571	347,212	449,007
February	92	455,344	322,862	427,065
March	137.	675,281	475,984	635,057
April	119	569,877	404,539	522,841
May	142	703,805	492,350	578,708
June	143	698,855	497,810	603,180
Total	1,088	5,416,787	3,843,035	4,969,792

TOLLS.

The tolls levied during the fiscal year, not including $80,872.79 levied on vessels of the United States Government, amounted to $4,343,383.69. The current expenses for operation and maintenance during the fiscal year were $4,112,550.48. The excess of toll earnings over expenses was, accordingly, $230,833.21. These figures, however, do not take into account the depreciation of plant, except in a few cases of relatively slight importance, and do not consider the interest on the money invested, or a charge to amortize the debt. And a considerable part of the tolls will be refunded on account of the ruling that the tolls shall not be greater than the equivalent of a charge of $1.25 per net ton on the basis of measurement for registry in the United States. This will wipe out the present profit.

The following is a summary of the earnings by months during the year:

July	$7,598.40	February	$383,904.96
August	88,401.80	March	560,784.96
September	266,513.28	April	442,415.49
October	375,787.44	May	547,054.60
November	381,533.28	June	541,181.55
December	410,043.60		
January	419,037.12	Total	4,424,256.48

COMPARED WITH RAILWAY TRAFFIC.

The extent of the movements through the canal may perhaps be better grasped by means of comparison with railway traffic. The following excerpt from the new Official Handbook is pertinent:

"An expression of this quantity in terms of railway traffic is illuminating. During the fiscal year ending June 30, 1914, the Panama Railroad handled 643,178 tons of through freight between the seaboards of the Isthmus. During that year the railroad was supposed to be handling more freight per mile of track than any other railroad in the world. It will be noted that the through traffic of the Panama Railroad that year was within 9,000 tons of the amount carried through the canal during the month of March, 1915 (which was 635,057 tons); in other words, that the canal has handled in a month almost as much as the railroad did during a year.

"The trains of the Panama Railroad engaged in hauling through freight were made up from 18 to 20 loaded cars, carrying in the aggregate about 350 tons. To handle 5,000,000 tons of cargo across the Isthmus in a year by rail would require the operation of 39 trains a day. It would mean dispatching a train each way every hour and a quarter, and trains passing a given point about every 40 minutes through every hour of the year. The 14,285 trains necessary for handling this traffic would have, at 800 feet each, an aggregate length of over 2,142 miles, greater than the distance from New York to Colon. In a single train the cars would reach from New York to Chicago and back, or from New York to Chicago and then down to New Orleans, and leave several hundred miles of train to spare.

"During the month of March, 1915, the laden vessels going through the canal had an average of 5,040 tons of cargo. Thus the vessels contained, on an average, over 14 trainloads of goods each.

"The locomotives and trains of the Panama Railroad are about the average in freight work. A comparison in the maximum terms of railway traffic is afforded by the trial trip made last year by what was called the world's largest locomotive, the 'Matt H. Shay,' of the Erie Railroad. This was termed 'three engines in one,' and on the trial trip handled a train of 55 cars of coal, said to have been the heaviest train ever hauled from Baltimore to Philadelphia by one locomotive. This train carried 4,012 tons, which is less than the average load on each ship going through the canal."

Distribution of traffic through The Panama Canal.

ATLANTIC TO PACIFIC.

Month.	United States coastwise.			Europe to west coast of United States and Canada.			Europe to South and Central America.			United States to South and Central America.		
	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.
1914.		*Tons.*	*Tons.*		*Tons.*	*Tons.*		*Tons.*	*Tons.*		*Tons.*	*Tons.*
August	9	42,326	37,673	.....	....	....	.....	....	....	.....	....	....
September	14	83,440	60,750	1	6,000	3,401	1	4,500	4,316	3	17,810	9,386
October	14	69,998	59,785	3	15,708	11,658	2	6,532	10,273	4	18,687	14,916
November	20	84,142	65,319	3	11,220	11,785	2	6,006	7,674	6	19,693	16,975
December	16	66,461	51,383	2	7,414	4,880	3	1,584	6,162	6	17,249	21,206
1915.												
January	18	118,357	77,362	4	6,494	14,829	4	3,615	7,024	7	19,890	24,277
February	10	59,156	42,067	3	8,720	11,428	8	9,209	16,133	4	6,342	19,347
March	17	96,544	70,475	4	7,097	13,647	10	4,572	24,682	10	53,506	29,573
April	17	121,064	70,189	5	14,038	13,758	8	6,477	13,859	8	28,993	29,156
May	22	118,375	86,333	2	6,873	6,805	7	9,820	17,902	10	43,406	32,927
June	15	91,181	68,454	4	15,914	13,073	7	12,984	16,671	21	68,934	61,188
Total	172	951,044	689,790	31	99,478	105,264	52	65,299	124,696	79	294,510	258,951

Month.	United States to Far East, including Australia.			Miscellaneous.			Ballast.		Total.		
	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.	Vessels.	Canal net.	Vessels.	Cargo carried.	Canal net.
1914.		*Tons.*	*Tons.*		*Tons.*	*Tons.*		*Tons.*		*Tons.*	*Tons.*
August	1	6,780	3,591	.....	....	....	3	667	13	49,106	41,931
September	4	30,012	16,748	.....	....	....	4	15,083	27	141,762	109,684
October	9	51,201	33,985	1	5,943	3,618	11	40,237	44	168,069	174,472
November	11	66,994	43,164	5	18,455	11,026	7	16,882	54	206,510	172,825
December	11	69,427	47,748	3	17,100	9,869	2	4,428	43	179,235	145,676
1915.											
January	7	39,404	25,417	3	20,322	14,984	1	5,335	44	208,082	169,228
February	11	67,560	47,146	.....	....	....	3	11,218	39	150,987	147,339
March	8	48,499	33,947	2	7,229	7,234	6	8,010	57	217,447	187,568
April	10	61,512	39,517	1	5,300	3,312	10	29,422	59	237,384	199,213
May	13	65,772	54,513	1	2,288	1,536	12	40,082	67	246,534	240,098
June	17	120,356	67,915	3	11,250	9,638	16	59,755	83	320,619	296,694
Total	102	627,517	413,691	19	87,887	61,217	75	231,119	530	2,125,735	1,884,728

PACIFIC TO ATLANTIC.

Month.	United States coastwise.			West coast of United States and Canada to Europe.			South and Central America to Europe.			South and Central America to United States.		
	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.
1914.		*Tons.*	*Tons.*		*Tons.*	*Tons.*		*Tons.*	*Tons.*		*Tons.*	*Tons.*
August	6	39,558	21,329	2	12,000	7,330	.....	....	....	2	10,620	11,665
September	9	63,458	39,914	6	41,967	23,845	.....	....	....	10	71,451	40,803
October	21	116,433	76,026	14	103,380	59,308	3	18,478	10,768	2	14,997	7,642
November	14	95,213	57,532	12	89,902	52,046	2	12,498	8,708	9	44,633	31,574
December	18	87,780	67,690	17	103,860	58,815	8	40,784	26,425	8	24,295	23,653
1915.												
January	11	51,319	36,766	11	67,302	38,597	13	54,533	39,283	14	67,771	48,349
February	15	83,434	55,604	14	92,732	53,616	11	37,703	25,691	12	55,209	36,431
March	20	98,312	66,558	16	109,148	63,658	13	66,790	45,475	20	107,760	72,224
April	12	80,660	47,728	6	40,556	20,669	16	54,541	42,373	16	88,262	61,486
May	19	73,501	67,841	8	43,543	30,670	21	95,045	58,167	17	87,805	59,137
June	18	105,946	75,513	5	31,031	14,261	16	58,001	46,638	17	80,558	55,548
Total	163	895,614	615,501	111	735,421	422,815	103	438,373	303,528	127	653,361	448,512

Distribution of traffic through The Panama Canal—Continued.

PACIFIC TO ATLANTIC—Continued.

Month.	Far East, including Australia, to United States.			Miscellaneous.			Ballast.		Total.		
	Vessels.	Cargo carried.	Canal net.	Vessels.	Cargo carried.	Canal net.	Vessels.	Canal carried.	Vessels.	Cargo carried.	Canal net.
1914.		*Tons.*	*Tons.*		*Tons.*	*Tons.*		*Tons.*		*Tons.*	*Tons.*
August	.....	.....	.....	.....	.....	.....	1	723	11	62,178	44,047
September	.....	.....	.....	1	3,400	3,158	4	3,655	30	180,276	111,375
October	.....	.....	.....	.....	.....	.....	.....	.....	40	253,288	153,744
November	.....	.....	.....	1	45	46	.....	.....	38	242,291	149,906
December	2	14,500	8,148	.....	.....	.....	4	13,887	57	271,219	198,618
1915.											
January	.....	.....	.....	.....	.....	.....	5	14,989	54	240,925	177,984
February	1	7,000	4,181	.....	.....	.....	.....	.....	53	276,078	175,523
March	3	23,600	13,653	3	12,000	10,197	5	16,651	80	417,610	288,416
April	3	16,438	15,234	1	5,000	3,368	6	14,468	60	285,457	205,326
May	6	29,632	28,747	2	2,648	1,389	2	6,301	75	332,174	252,252
June	1	7,025	4,863	.....	.....	.....	3	4,293	60	282,561	201,116
Total	16	98,195	74,826	8	23,093	18,158	30	74,967	558	2,844,057	1,958,307

APPENDIX F.

REPORT OF THE CHIEF QUARTERMASTER, SUPPLY DEPARTMENT.

Balboa Heights, Canal Zone,
July 15, 1915.

Sir: I have the honor to submit the following report of the operations of the supply department for the fiscal year ending June 30, 1915.

ORGANIZATION.

The medical storehouse, which had been taken over by this department on April 1, 1914, was retransferred to the health department on July 1, 1914, together with its personnel.

The building division, which had been made a part of this department on August 1, 1913, was created into a separate division as of October 1, 1914, and its entire personnel transferred out of this department.

PERSONNEL.

The following are some of the changes in personnel during the fiscal year:

Capt. R. E. Wood, United States Army, was relieved as chief quartermaster, effective October 1, 1914.

Maj. W. R. Grove, United States Army, was appointed chief quartermaster, effective October 1, 1914.

Capt. Frank O. Whitlock, United States Army, was relieved as assistant chief quartermaster, effective October 7, 1914.

Mr. Harry Dundas was relieved as district quartermaster of the Pedro Miguel district, as of November 1, 1914, and Mr. H. F. Sedwick appointed in his place as of that date.

Capt. Frederic H. Smith, United States Army, was appointed assistant chief quartermaster, effective December 11, 1914.

Mr. Otis W. Barrett, horticulturist, was assigned to this department, effective December 15, 1914.

Mr. Benjamin L. Jacobson, was placed in charge of the line commissaries, in addition to his other duties as depot commissary, effective December 16, 1914.

Mr. Charles H. Mann was appointed sales agent, effective March 1, 1915, and the title of depot quartermaster was abolished.

LABOR.

Due to the continuance of construction work at the Pacific end of the canal, and dredging operations in Gaillard Cut, there was only a slight decrease in the force at work as of June 30, 1915, compared with the previous year, the exact figures being 26,897 for this fiscal year as compared with 29,673 for the fiscal year ending June 30, 1914, a difference of 2,776. The largest force working at any one time was in July, 1914, when the total was 32,437.

Labor conditions have been favorable throughout the year, there being a surplus in all grades. This was particularly true as regards common laborers. With the closing of certain units of the work the surplus became so great that it became necessary to make some arrangements for the repatriation of those for whom it was impossible to secure employment. Preference was given first to employees who had been discharged on account of reduction of force, and their families; and second to men and their families in destitute circumstances, and those too old or physically unfit for efficient service. The first lot, consisting of 140, were given deck passage on the Royal Mail Steam Packet Co. steamship *Magdalena*, sailing from Colon on Thursday, October 6, 1914, destined for Barbados, Trinidad, Grenada, St. Vincent, St. Lucia, Monserrat, Antigua, Nevia, and St. Kitts. The second dispatch was the United Fruit Co. steamship *Metapan*, on October 8, with 82 deck passengers for Kingston, Jamaica. The Royal Mail steamship *Orotava* on October 20 carried 323 laborers for Barbados, other ships following about fortnightly, until the total repatriated numbered 3,355 during the months of October, November and December, 1914, at a total cost of $52,468.75; the totals for the fiscal year being as follows:

Nationality.	Number.	Cost.
Americans	1,222	$47,127.70
West Indians	4,908	51,899.59
Europeans	643	22,315.80
Total	6,773	121,343.09

This has materially relieved the congestion in the labor situation, although the number availing themselves of the opportunity to return to their homes, was not in proportion to those without employment, the men apparently not desiring to return to their native lands after becoming accustomed to the higher wage scale prevailing on the Canal Zone. The excess of departures continued throughout the year, although not so marked as for the previous one, the quarantine reports showing a net decrease of 5,466, as compared with 14,822 for the previous period. No contract laborers were recruited during the year.

QUARTERS.

The process, which was started in the closing months of the preceding fiscal year, of abandoning the settlements on the west side of the canal, was completed by the end of the calendar year 1914, although the town of Culebra was not taken over by the Army until March 25, 1915. The offices, together with the personnel, in the administration building, Culebra, were moved to the new administration building at Balboa Heights on September 1, 1914. For a time it was necessary for a number of employees, both gold and silver, to ride to and from Balboa on labor trains until such time as family quarters were available. This condition, however, was soon eliminated through assignments at Corozal, Ancon, and Balboa. A number of temporary assignments were made at Culebra, and when this town was vacated these families were given quarters at La Boca, through the conversion of a type 18 house and several silver married quarters into apartments for gold families. The town of Empire was abandoned and taken over by the Army on November 25, 1914.

There has been a general decrease in the number of waiting applicants for family quarters in all districts, and only in the Ancon-Balboa district is the situation acute, but even in that district the number has decreased from 545 on June 30, 1914, to 274 on June 30, 1915, while the total for the Isthmus has decreased from 1,188 to 642. Conditions are particularly favorable at Gatun, where all applicants who are working within the district and applying for family quarters, have been assigned. Assignments to gold family quarters at Corozal were discontinued on June 1, in order to prepare for the eventual turning over of this town to the Army, and arrangements were made to take care of the families now quartered there, by transfer to the Ancon-Balboa district, where 40 concrete and 80 frame apartments are now under construction, most of which will be completed by September 1, 1915. These apartments, together with the vacancies which will naturally occur in the meantime, will probably take care of the 180 families now living at Corozal.

One district was abolished during the year, viz, Empire-Culebra, leaving five districts in the organization.

The total number of men, women, and children occupying Panama Canal quarters decreased from 17,938 to 15,076. This reduction can be accounted for by the abandonment of the settlements on the west side of the canal; a decrease in the work at Gatun, where a large number of gold employees and European laborers were laid off, together with a decrease in the number of Europeans employed generally over the work.

With the completion of the 120 family apartments authorized for the Ancon-Balboa district, there will be accommodations in that district for 613 gold families and 1,500 gold bachelor employees. This, it is believed, will afford sufficient accommodations to satisfactorily quarter the permanent gold bachelor force employed at the Pacific end of the canal, with some remodeling of quarters so as to make better living conditions; but it is probable that there will not be sufficient gold married quarters.

There is still a congestion in silver family quarters at La Boca, where there are over 500 applications on file. This condition, in a measure, also prevails in other districts on the Zone. Eighty apartments have been authorized for silver families at Pedro Miguel, and when these are completed it will partially relieve conditions at Paraiso and Pedro Miguel, as well as lessen the necessity for labor-train service between those places and Panama.

Under authority of Executive Order No. 2120, dated January 15, 1915, a rental was charged for all quarters, fuel, and electric current, effective March 1, 1915. Accordingly, a schedule of rents was adopted for all quarters, and put into effect as of that date. The schedule was based upon the area of the apartment occupied, the condition of the house, desirability of location, etc., the rates being one-half cent per square foot for living space, and one-quarter cent per square foot for porch space, per month. The type 14 family quarters being the predominating one on the Isthmus, was taken as a basis.

This style of house has four apartments, each containing approximately 1,000 square feet of floor space, divided into 600 square feet for living and 400 square feet for porch space, making the rental for an apartment of this type $4 a month. To this was added a monthly rent of $1.50 for furniture and 50 cents for the collection of garbage and care of grounds, making the total rental for an apartment in a type 14 house $6 per month. In addition to this the occupants paid for the fuel and electric current used. It was found that by applying these factors to the various types of houses on the Zone, that this schedule worked out reasonably and equitably for all, and very few complaints were received. The same principal was applied to bachelor quarters, excepting that furniture, care of grounds, and cleaning materials were figured at 75 cents per room per month, and janitor service at actual cost. During the three months this executive order remained in effect the rentals collected were as follows:

Month.	Gold.	Silver.	Total.	Electric current.	Grand total.
March	$18,357.31	$4,259.90	$22,617.21	$3,186.85	$25,804.06
April	16,795.63	5,488.00	22,283.63	3,246.67	25,530.30
May	16,884.00	5,559.74	22,443.74	3,168.67	[1] 25,612.41

[1] Includes rentals collected for the entire month of May.

The order was suspended by the President, effective May 25, 1915, under provisions of Executive Order No. 2204.

The rock crusher at Porto Bello having been abandoned, a force of 8 gold and 120 silver employees went to Porto Bello in August to take out the balance of the houses, scrap, and equipment at that point. Three type 17 and four type 14 houses still remained on the hill, and these were taken down in sections, transported to Ancon, and reerected there. A large quantity of scrap, a miscellaneous assortment of tools and property, and a number of items of equipment were moved to Mount Hope Depot. The work was completed and the station permanently abandoned in September.

In order to encourage the silver employees quartered in La Boca in the policing and care of quarters and the cultivation of grass and plants, all with a view to improving the general appearance of the settlement, a general plan was approved on October 17 whereby prizes were offered for the best kept house of each type. Monthly inspections are made by a committee, and the employees to whom prizes are awarded are allowed the amount of the prize in the form of a deduction from the rental charge for the succeeding month. As a result there has been a decided improvement in the general appearance of the townsite and in the sanitary condition of the quarters.

ZONE SANITATION.

The collection and disposal of garbage and night soil and the cutting of grass continued under the supervision of this department throughout the year, excepting at Cristobal-Mount Hope. At these places the work was turned over to the health department in October, 1914, as it was not deemed advisable to maintain two separate organizations in the same district, especially as the work at Cristobal-Mount Hope was only a small proportion of that performed by the health department in Colon. After eight months' trial this arrangement has proven satisfactory.

There has been a decided decrease in the area of grass to be cut for sanitary purposes on the Zone, as well as in the collection of garbage, owing to the abandonment of the settlements on the west side of the canal. The cost of Zone sanitation proper decreased from $84,594.32 for the fiscal year ending June 30, 1914, to $47,550.52 for the present year.

CORRALS.

The demand for teams and wagon transportation throughout the year has exceeded expectations, with the result that all animals were worked to their full capacity. As nearly all of the animals have been on the work for a number of years, it has resulted in a number becoming unserviceable and unfit for further use. The number that died or were destroyed during the year was 6 horses and 40 mules, as compared with 9 horses and 41 mules for the preceding period. The following table shows the losses from disease, accident, condemnation, and sale since the inception of the work:

	Horses.	Mules.
Animals purchased since inception of work	162	746
Animals condemned and sold since inception	27	76
Animals died and destroyed since inception	64	272
Animals in corrals June 30, 1915	71	398

Anticipating a possible decrease in the demand for wagon transportation, no animals were purchased during the year, excepting two fire horses. This left the corrals with no reserve supply on hand. It is not the intention to replace the animals which are lost, but to substitute, so far as is practicable, motor trucks for wagon transportation, and in pursuance of this plan two small delivery trucks, one 1-ton truck, and one 3-ton truck have been purchased for the supply department, and the health department has purchased a 1-ton truck and an ambulance.

MATERIAL AND SUPPLIES.

The policy of limiting stocks so far as possible was continued. A total of 1,428 requisitions were prepared and forwarded to the general purchasing officer, as compared with 1,403 during the preceding fiscal year. There was an increase in the number of cable orders placed.

The value of material received during the fiscal year was $8,018,418.03, as compared with $11,116,395.10 for the preceding fiscal year, and the local purchases amounted to $1,360,469.71, as compared with $2,293,144.66 for the fiscal year 1914. Local purchases of coal dropped from $929,176.57 to $543,055.36, and local purchases of oil dropped from $863,206.66 to $609,760.37. The reduction in the amount of fuel oil purchased locally was due to the provisions made for the storage of fuel oil and the taking over from the Union

Oil Co. of the balance of oil on hand. Other than the items of coal and fuel oil, there have been no important local purchases during the year, except the regular supplies from the Panama Railroad and the Panama Railroad commissaries, these totaling $156,857.06, as compared with $370,900.40 for the last fiscal year.

The tonnage of material received was considerably less than for the previous fiscal year, 211,000 short tons being received as compared with 290,000 tons for the preceding year. These figures include piling. The decrease of aggregate tonnage is due to decrease in the receipts of structural steel, cement, piling, dynamite, etc. Lumber receipts show a decrease of approximately 11,000,000 board feet, although the total amount of lumber on order at this time exceeds that of last year. The amount of piling received has also decreased from 20,394 pieces last year to 9,306 for this year.

Prices on staple commodities have, on the whole, been favorable. Until the European war had been in progress for some time, there was no marked increase, and while lumber, forage supplies, etc., have been considerably increased during the past five or six months, contract prices for steel have not as yet been seriously advanced. Other metals have shown a very sharp increase within the past two months.

As compared with last year there are but few important contracts pending for construction material. Delivery of 19 electric towing locomotives and 49 pieces of fender chain during the fiscal year completed the more important contracts for lock material. A requisition for 12 extra electric towing locomotives is pending. The construction material for the Cristobal and Balboa coal-handling plants constitutes the greater part of this class of material received during the year. This, however, has not been handled by this department, the delivery and erection being entirely under the control of the contractors. Two tugs, the *Tavernilla* and *Gorgona*, have been received and placed in service, their total cost being $304,000. Contracts were placed April 9, 1914, for the construction of two colliers, the *Ulysses* and *Achilles*, at a total contract price of $1,975,000. Both have been received and placed in commission during the year. Three 1,000-yard steel dump scows, ordered in February, 1915, are in the course of construction, two being now ready for delivery, the contract price of same being $62,600 each. The dredge *Cascadas*, contracted for in January, 1915, at a cost of $376,180, was successfully launched at Camden, N. J., on June 26, 1915.

OPERATION OF STORES.

At the beginning of the fiscal year the main storehouse at Balboa, building No. 5, was incomplete, although a considerable amount of material had already been moved into this building. The building was completed in September, 1914, and the work of concentrating the stock of supplies, begun during the previous year, was continued, and Balboa was made the main storehouse. All of the active stock was transferred from Mount Hope to Balboa, the value of the material moved being approximately $1,500,000. No material was transferred that was considered surplus or obsolete, and this is now being appraised for sale. The approximate value of the material remaining at Mount Hope after the completion of the transfer was $1,250,000, and on December 1, 1914, Mount Hope was made a storehouse for obsolete and surplus material only, the storehouse at dry dock increasing its stock to protect all requirements at the Atlantic end.

In making the transfer of stock some adjustment was necessary in the organization of the department. The inspection, checking, and receiving of material at Cristobal and Balboa Docks was placed under the Balboa store organization, and the responsibility for the upkeep of stock was transferred from Mount Hope to Balboa, together with the necessary personnel. The dry-dock storehouse at Cristobal was added to the Balboa store organization. When this transfer was completed all the stock except paints and oils and obsolete and surplus material had been removed from Mount Hope, and with the completion of the oil house at Balboa in April of this year the paints and oils were also moved from Mount Hope. The permanent forage shed at Balboa was completed during June. All spare lock and gate parts have been assembled at Corozal, and issues of same are made through the Balboa store. A statement showing the total yearly issues and stock on hand as of June 30, 1915, for all the storehouses is appended hereto.

At 9.25 a. m. on July 5, 1914, the Mindi dynamite magazine for the storage of explosive blew up. At the time of the explosion there were in storage in this magazine 210,500 pounds of 45 per cent and 224,650 pounds of 60 per cent dynamite, and 11,600 pounds of 60 per cent Trojan powder, the total value of all of which was $51,957.53. The building was valued at $7,788.70 and was totally wrecked. Only one life was lost, that of the day watchman, who was on duty at the time of the explosion. A board investigated the matter and submitted its report on July 16, and while several possible theories were advanced no definite conclusions were reached as to the exact cause, and in the absence of any other it was attributed to spontaneous combustion. With the exception of the Trojan powder the dynamite had been in storage for less than four months and, so far as could be ascertained from samples of the same shipments on the work, showed no signs of deterioration or other physical change which would result in premature explosion. This is the only explosion of dynamite in storage magazines since the inception of the work. Glass was broken at Gatun and Cristobal, approximately 4 miles distant, but farther than this no damage was done, which indicates that the selection of location was a wise one.

SCRAP.

All accessible scrap on the Isthmus has been collected during the year and shipped to the scrap yard at Mount Hope. Due to the poor condition of the scrap market throughout the entire year, no sale of scrap iron or steel has been made except three shipments of scrap car wheels, which were shipped to New York to furnish ballast for Panama Railroad steamers. All scrap on hand and that received during the year has been classified, and same is now being advertised for sale by sealed bids to be opened July 7. There were received at the scrap yard during the year approximately 12,000 gross tons. There are approximately 24,600 gross tons of classified American scrap iron and steel and 6,000 tons scrap rail now in storage.

The contract with the Chicago House Wrecking Co., dated September 26, 1911, for all French scrap on the Isthmus, which has been the subject of controversy for several years, was finally closed in December, 1914, by The Panama Canal agreeing to turn over to that company four hundred 12-yard dump cars and 700,000 pounds of scrap copper and brass, and the Chicago House Wrecking Co. relinquished all claim to the French scrap they had collected and stored at Mount Hope. Delivery of the scrap copper and brass was effected in January, and 125 dump cars had been delivered at the close of the year. The French scrap, which is estimated at between 25,000 and 30,000 gross tons, has been sold to Mr. M. Rovetta, at the rate of $5.65 per gross ton alongside ship, but no shipments have been made as yet, presumably due to his inability to get bottoms.

The collection of miscellaneous scrap has continued with good results, the total net receipts amounting to approximately $67,799.54. The following table shows the different classes and quantities sold:

Material.		Amount.	Net proceeds.
Copper screening	pounds..	46,678	$5,704.66
Copper and brass	do....	83,251	8,393.48
Do	do....	324,374	[1] 45,316.41
Copper wire	do....	7,990	785.37
Rope	do....	126,738	3,018.79
Platinum	grams..	1,123	168.46
Rubber and rubber hose	pounds..	198,108	1,264.67
Car wheels	do....	1,264,080	2,099.25
Potash residue	do....	22,755	158.33
Leather belting	do....	10,382	552.45
Chain	do....	81,600	259.94
Lamp bases	do....	46,534	77.73
Total		....	67,799.54

[1] The returns from this shipment have not yet been received, and the net proceeds are approximate.

The department has received 9,055 tons of rails and fittings and has sold and reissued 11,801 tons, which was all the relaying rail available.

SALES.

Sales of surplus and retired equipment and material have been continued under the same authority as was in effect during the last fiscal year. All equipment has been prepared for storage by the mechanical division as retired from service. The total sales for the year follows:

Scrap	$11,169.49
Obsolete equipment	104,742.46
Miscellaneous, surplus, and obsolete material	99,631.03
Stock material	324,430.63
Panama Railroad (general)	1,376,953.39
Panama Railroad (commissary)	83,222.10
Total	2,000,149.10

The following are the principal items of equipment sold:

Steam shovels	12	Crusher	1
Narrow-gauge locomotives	4	Star drills	16
Decauville locomotive	1	Barges and clapets	4
12-yard dump cars	15	Tons of relay rail	3,276.37
18-yard dump cars	100	Narrow-gauge dump cars	15
Goodwin dump cars	12		

The Alaskan Engineering Commission is now loading a steamer with equipment and material from our surplus stock for transfer to Alaska, of which the following are the principal items:

12-yard Oliver dump cars	35	Steam shovel, 45-ton	1
Lidgerwood cars	15	Pile drivers	2
Locomotives, 201 class	4	Star well drills	12
Steam shovel, 70-ton	1		

Also a miscellaneous assortment of shop machines and small tools.

A catalogue listing all the machinery and equipment available for sale, as of March 1, showing estimated cost of repairs, sales price in present condition, and sales price repaired and crated was printed and distributed throughout the United States, Central and South America. A sale of 13 locomotives was canceled because of the purchaser refusing to sign an agreement that they would not be resold for use by any of the belligerent nations in the European war.

SUBSISTENCE.

The supply department continued during the fiscal year the management of the Washington, Tivoli, and Aspinwall Hotels, of the line restaurants, and of the laborers' messes. The Hotel Washington is owned and financially supported by the Panama Railroad Company. All of the remainder are entirely supported by The Panama Canal. The general method of administration was the same as that followed heretofore. Capt. F. H. Smith, as assistant chief quartermaster, has been in direct charge of the hotels.

Due to the continued falling off in the tourist traffic to the Isthmus, the revenues of the Tivoli and Washington showed a decrease from 1914 of $72,518.69. There is no indication that there will ever be a material increase in the tourist traffic. Therefore, so long as the two hotels are continued as at present, the fiscal year 1915 may be considered a maximum as to revenue from transient guests.

In October the question of abandoning the Aspinwall Hotel was raised. It was decided to withhold action until a test could be made as to whether an adequate launch service and proper advertising could popularize the hotel, a determined effort being made at the same time to conduct the hotel in a manner to make it an attractive place in which employees might pass all or a part of their annual leaves. During the period January 15 to November 6, 1914, there had been an average daily house count of 4.03, of whom 2.006 were employees, 1.03 families of employees and 0.994 nonemployees. In the period January 1 to June 30, 1915, the total revenue was $17,620.33, a net profit for the period of $621.34, making a net loss for the fiscal year of $1,409.89.

The great falling off of the numbers fed in the laborers' messes (silver) during the fiscal year has cut off an economical avenue for the disposal of the surplus or by-products of the hotels. This and the general rise in prices has raised the cost of foodstuffs supplied. On September 20, 1914, the Cristobal Hotel was opened as a cafeteria; on December 15, 1914, the Ancon Hotel was opened as a quick-order à la carte restaurant; on June 15, 1915, the Pedro Miguel Hotel was turned into a quick-lunch, continuous-service restaurant; and on June 30 the Balboa Hotel was discontinued as a 30-cent hotel and opened on

July 1 as a cafeteria. On September 15, 1914, a cafeteria lunch room was opened in the basement of the administration building, Balboa Heights, and on January 8, 1915, a similar lunch room was opened at the Balboa shops. The hotels at Toro Point, Margarita, Coco Solo, and Naos Island were also closed during the year, and noon lunch rooms opened at Coco Solo and Naos Island, so that at the end of the fiscal year the hotels at Gatun, Paraiso, and Corozal were the only ones operating on a 30-cent per meal basis, and their combined loss during the year was $1,074.98. During the period that rent was collected the hotel expenses to be met from revenue included fuel, light, and repairs to buildings. For the remainder of the year these charges were met by subsistence allotments.

This change in the method of charging for meals was radical, but it is believed to give more general satisfaction than would a self-supporting 30-cent meal. No itemized record is regularly kept at the hotels for breakfast, lunch, and dinner separately. To secure data on this point a record was kept for a limited period in April, 1915. During this period the average meal cost to the patrons was: Cristobal Cafeteria, 27.9 cents; Ancon Hotel, 30.6 cents. The average breakfast at Cristobal cost 21.24 cents, the average lunch 29.71, and the average dinner 31.42 cents. At Ancon, the average breakfast cost 19.5 cents, the average lunch 33.2 cents, and the average dinner 39.4 cents.

Each form of restaurant has its advantages which appeal to certain of its patrons. The cafeteria reduces labor cost and permits an actual inspection of food and portions before selection. Where foodstuffs are kept hot and freshly supplied, there is no question but that it gives the most satisfaction to the greatest number of people. The so-called 30-cent hotel on the Isthmus—and a flat-rate meal anywhere—appeals to the man who desires waiter service but does not desire the annoyance or responsibility of making out an order. Where second portions are allowed without charge, it is particularly popular with hearty eaters. The à la carte restaurant, conducted on the lines strived for at the Ancon Hotel, is preferred by the person who desires his food nicely served, properly seasoned and garnished, and who is willing to pay for the extra labor cost involved. For a total of 58,600 meals served at the Ancon Hotel, the labor charge per meal was 6.1 cents; for a total of 86,308 meals served at the Balboa Hotel, while conducted as a 30-cent hotel, the labor cost per meal was 3.2 cents; and for a total of 90,114 meals served at the Cristobal Cafeteria, the labor cost per meal was 2.8 cents. From these figures it is apparent that for the same cost to the patron, the amount of food served at a cafeteria is greater on the average by 3.3 cents per meal, than the food served at the Ancon Hotel. The à la carte system was installed at Ancon in response to a general demand for a place of its kind. To satisfy those who found it most convenient to go to the Ancon Hotel, but who preferred a table d'hôte service, club meals or specials have been run there since January 1, 1915.

The net revenue for the year from the line hotels and messes was $748,239.05, a decrease of $283,950.46 from last year, while the total cost of operations was $726,774.07, a decrease of $295,082.85, making a profit of $21,464.98, an increase of $11,132.39 over last year. Had charges for building repairs, fuel and light, etc., been made for the entire year, a net loss of $8,211.78 would have been shown. No equipment charge has been made. The ratio of supplies consumed to revenue was 7.83 per cent more than last year, making the ratio of total cost of operation to revenue 1.87 per cent less than last year. The percentage of profit to revenue was 1.87 per cent more than last year. The net expenses for salaries and wages was $96,046.07, a decrease of $37,592.74, making the proportion of net pay roll to revenue 12.83 per cent, or 0.11 per cent less than last year. The Tivoli Hotel showed a net loss of $1,974.16 for the year, compared with a net profit of $21,271.25 for last year. Had a charge been made for building repair, the net loss for the year would have been $6,498.93.

MOUNT HOPE PRINTING PLANT.

The value of the stock on hand at the close of the fiscal year was $45,198.38. New equipment of the value of $3,301.10 was purchased and installed, the principal items of which were a ruling machine and a pony Whitlock press. The value of equipment on hand as of June 30, 1915, was $36,529.31. The following table shows the principal items of manufacture:

Forms	38, 458, 915	Tags, assorted	2, 152, 650
Books (including binding)	210, 431	Stamps and daters	3, 540
Scratch pads	128, 550	Canal Records	631, 618
Sheets carbon	24, 000	Cardboards	47, 570
Pencil program	8, 050	Binders	3, 838
Time tables	96, 275	Sheets paper	4, 092, 836
Sheets ruled	88, 200	Programs	36, 970
Cards, guides, etc	227, 250		

The value of material issued during the year was $83,111.94, and the value of material used in manufacture was $37,053.09. In several instances bids were invited on various printing jobs, both from commercial firms in the States and the Government Printing Office, at Washington, and in each case the cost of doing the work on the Isthmus was considerably under the lowest bid received.

OPERATIONS OF THE COMMISSARY BRANCH.

I beg to submit the following report covering the commissary operations during the fiscal year ending June 30, 1915:

The commissary branch continued under the organization as outlined in the last report for the first quarter of the fiscal year. Upon the relief from duty of Capt. F. O. Whitlock, assistant chief quartermaster, under date of October 7, 1914, the supervisory authority over purchases and over the depot commissary which had been exercised by him was transferred to the office of the chief quartermaster, Mr. B. L. Jacobson, depot commissary, remaining in charge of the wholesale departments and manufacturing plants at Cristobal. The management of the retail commissaries was placed under the jurisdiction of the depot commissary on December 16, 1914, and all commissary storekeepers report direct to him.

No other important changes were made in the personnel or organization of the commissary branch during the fiscal year.

A new two-story concrete commissary was erected at Balboa at a cost of approximately $150,000, which was opened for business on May 11, 1915, on which date the old commissary building at Balboa was abandoned. The Toro Point commissary was reduced to a grocery and cold-storage commissary on May 1, and the Naos Island commissary was closed on June 30. The new concrete warehouse at Cristobal was completed about December 15, 1914, its total cost being approximately $103,000, thus placing all of the wholesale sections practically under one roof.

Due to the high prices at which beef is selling in the United States, and in an effort to reduce its cost to the consumer and at the same time provide fresher beef, it was decided to construct a slaughterhouse at Cristobal and arrange for the purchase and killing of cattle on the Isthmus. Accordingly, slaughterhouse operations were started on February 4, and at the present time nearly 50 per cent of the beef consumed on the Isthmus is Central American beef, bought on the hoof and killed by our forces. This beef can be sold considerably cheaper than States beef and is finding ready sale at the commissaries.

Owing to the increased demand for ice and cold-storage facilities on the Pacific end of the canal, and in view of the expense and large shrinkage resulting from the transportation of ice across the Isthmus, it was considered advisable to construct an ice and cold-storage plant at Balboa, adjoining the new commissary building, with a capacity of 100 tons per day.

The Ancon laundry was taken over from the health department on July 1, 1914, and is now operated as a part of the commissary branch.

The business of supplying foodstuffs, ice, etc., to passing ships has developed greatly during the past fiscal year, $150,228.70 worth of supplies having been sold to steamship companies for the year ending June 30, 1915, as compared with $10,779.98 for the previous year.

The total sales for the commissary branch for the fiscal year amounted to $6,666,644.84, as compared with $7,271,117.28 for the preceding period, a decrease of $604,472.44.

The following is a statement of the profits and losses of the commissary branch, shown by quarters:

Quarter ending—	Profit.	Loss.
Sept. 30, 1914	....	$45,466.68
Dec. 31, 1914	$31,633.65	....
Mar. 31, 1915	63,733.44	....
June 30, 1915	21,333.93	....
Total	116,701.02	45,466.68
Net profit for the fiscal year	71,234.34	....

In view of the profits for the quarter ending March 31, 1915, the surcharge on groceries was decreased 10 per cent as of May 1, 1915.

The following is a statement showing location of purchases made during the year, as compared with the previous fiscal year:

Location.	1914	1915
United States	$4,287,615.30	$4,326,714.67
Foreign	722,840.14	575,225.07
Local	452,282.12	141,951.66
The Panama Canal	26,725.81	45,188.00
Total	5,489,463.37	5,089,079.40

Architectural changes were made in the roof over the ammonia condensers at the Cristobal ice plant, and new fore-coolers are now being installed. A chill room for native beef slaughtered on the Isthmus was added to the refrigerating plant, and the unloading platform at the cold-storage plant was reconstructed of concrete.

Difficulty having been experienced with the handling of potatoes, a frame building at Cristobal was converted, by removal of partitions, etc., into a potato storage house. Air is forced through ducts under the floor and holes in the floor to create a draft for proper ventilation. In bringing potatoes from the United States it was found that by shipping them between decks, instead of in cold storage, the freight rate is greatly reduced and the quality of the potatoes improved. This method is followed during the greater part of the year, but there are three months during the latter part of the old-potato season when this scheme is not feasible, as the potatoes have not sufficient keeping qualities to be shipped out of cold storage.

The report of the financial operations of the commissary branch will be embodied in the report of the auditor of The Panama Canal and local auditor of the Panama Railroad.

Respectfully submitted.

Wm. R. Grove,
Chief Quartermaster.

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

EXHIBIT NO. 1.—*Force actually at work on June 23, 1915.*

Department or division.	Silver employees (wages specified in United States currency).												Total.		Grand total.
	Monthly.	Artisans.					Laborers.						Silver.	Gold.	
		Special.	22 cents.	18 cents.	15 cents.	12 cents.	Special.	[1] 16 cents.	13 cents.	10 cents.	7 cents.	5 cents.			
Operation and maintenance:															
Locks and office	422	....	2	28	49	3	25	8	4	147	....	2	690	144	834
Terminal construction	404	....	68	235	719	184	62	81	388	613	2	21	2,777	297	3,074
Building	72	15	292	468	559	23	....	17	311	279	1	11	2,048	173	2,221
Electrical	97	5	47	76	156	145	....	1	117	25	....	8	677	178	855
Municipal engineering	280	4	57	177	281	181	96	35	149	1,020	4	40	2,324	80	2,404
Dredging	1,702	1	9	28	74	12	....	14	163	74	1	2	2,080	302	2,382
Mechanical	157	12	73	113	587	611	....	13	48	186	8	4	1,812	863	2,675
Marine	148	....	....	....	....	....	24	....	....	....	....	....	172	51	223
Fortification	73	....	46	71	214	23	35	....	65	241	....	5	773	98	871
General construction	10	....	....	....	4	4	....	65	17	32	1	1	134	4	138
Total	3,365	37	594	1,196	2,643	1,186	242	234	1,262	2,617	17	94	13,487	2,190	15,677
Supply:															
Main office	14	....	....	....	....	....	....	....	....	....	....	....	....	14	14
Commissary	729	....	4	7	14	16	253	6	....	130	18	....	1,168	150	1,318
Subsistence	486	....	3	1	1	2	....	....	....	....	....	....	493	25	518
Quartermaster	791	28	76	94	126	....	51	39	135	963	....	5	2,308	76	2,384
Accounting	23	....	....	....	....	....	....	....	....	....	....	....	23	197	220
Health	397	....	3	4	6	....	11	....	14	360	10	17	822	160	982
Executive	159	2	1	2	....	....	....	....	....	....	....	....	164	400	564
Panama Railroad	319	179	68	204	417	732	1,658	68	495	387	8	15	4,550	295	4,845
Contractors	83	2	2	7	26	....	121	....	37	4	....	7	289	86	375
Total	6,343	248	751	1,515	3,233	1,936	2,336	347	1,943	4,461	53	138	23,304	3,593	26,897

[1] European.

EXHIBIT NO. 2.—*Force reports by months, fiscal year 1914–15, including contractors' force.*

Year and month.	The Panama Canal.		Panama R. R. Co.		Contractors' force.		Grand total.
	Gold.	Silver.	Gold.	Silver.	Gold.	Silver.	
1914.							
July	4,198	22,846	508	4,806	6	73	32,437
August	4,009	20,753	512	3,547	8	54	28,883
September	3,806	20,421	474	3,440	8	50	28,199
October	3,694	19,751	428	2,846	26	14	26,759
November	3,566	19,490	374	2,790	33	24	26,277
December	3,429	19,435	379	3,714	55	29	27,041
1915.							
January	3,334	17,592	367	3,271	12	277	24,853
February	3,088	17,023	377	2,601	29	327	23,445
March	3,034	17,110	359	2,911	32	328	23,774
April	3,173	18,332	151	2,785	37	337	24,815
May	2,983	18,124	390	4,377	79	258	26,211
June	3,212	18,465	295	4,550	86	289	26,897

EXHIBIT NO. 3.—*High and low force records, December, 1906, to June 30, 1915, by fiscal years.*

	The Panama Canal.			Panama R. R.	Total Panama Canal and Panama R. R.
	Gold.	Silver.	Total.	Gold and silver.	
1906.					
December	3,881	15,604	19,485	4,416	23,901
1907.					
October	4,992	20,836	25,828	6,139	31,967
January	4,033	16,987	21,020	4,796	25,816
1908.					
April	4,950	21,168	26,118	7,052	33,170
November	4,161	19,803	23,964	5,863	29,827
1909.					
October	4,376	23,411	27,787	7,618	35,495
January	4,295	20,583	24,878	6,393	31,271
1910.					
March	4,553	26,284	30,837	7,829	38,676
December	4,705	24,383	29,098	6,044	35,142
1911.					
December	4,420	25,439	29,859	7,967	37,826
June	4,292	21,795	26,087	6,603	32,690
1912.					
January	4,332	25,818	30,150	8,024	38,174
August	4,122	24,860	28,982	5,855	34,837
1913.					
August	4,087	30,918	35,005	4,957	39,962
December	3,744	23,209	26,953	5,195	32,148
1914.					
January	3,944	23,824	27,768	5,502	33,270
June	3,790	21,499	25,289	4,343	29,632
1915.					
July	4,198	22,846	27,044	5,314	32,358
February	3,088	17,023	20,111	2,978	23,089

NOTE.—Figures do not include contractors' forces. If taken into consideration, the greatest working force ever reported was 44,733 on March 26, 1913.

EXHIBIT No. 4.—*Occupants of Panama Canal and Panama Railroad quarters June 30, 1915.*

Place.	Gold.			Europeans.			West Indians.			Total.
	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.	
Balboa[1]	893	230	250	[2] 96	8	12	[3] 1,562	496	627	4,174
Ancon	922	434	457	4	....	....	255	16	....	2,088
Corozal	237	200	190	1	1	2	296	35	46	1,008
Pedro Miguel[4]	205	112	140	8	....	....	[5] 248	40	42	795
Paraiso	282	75	88	95	7	23	378	108	110	1,166
Culebra[6]	19	13	19	1	1	6	[7] 424	277	313	1,073
Gamboa	23	3	5	....	....	....	105	19	30	185
Gatun	214	171	190	73	3	6	211	103	106	1,077
Cristobal[8]	931	345	443	66	....	....	[9] 1,140	185	400	3,510
Total	3,726	1,583	1,782	344	20	49	4,619	1,279	1,674	15,076

[1] Includes Taboga Island, Naos Island, and Palo Seco.
[2] Includes 20 Asiatics.
[3] Includes 12 American negroes, 60 Colombians and Panamanians, and 2 Panamanians on the gold roll.
[4] Includes Miraflores.
[5] Includes 29 Panamanians.
[6] Includes Empire, Las Cascadas, and Bas Obispo.
[7] Includes 10 Panamanians.
[8] Includes Colon Beach and Colon Hospital.
[9] Includes 35 East Indians, 15 American citizens, and 79 Panamanians.

NOTE.—Gold force of contractors, included above, 49 bachelors.

EXHIBIT No. 5.—*Applications for married quarters on file June 30, 1915.*

Ancon	274	(84)
Corozal	39	
Paraiso	145	(37)
Gatun	55	(12)
Cristobal	129	(23)
Total	642	(156)

NOTE.—The figures in parentheses show the number of applicants already occupying regular or nonhousekeeping family quarters at stations other than those at which applications are filed. The keeping of two lists has been abolished, all applicants receiving assignments in strict accordance with the date of their last entrance into the service.

EXHIBIT No. 6.—*Animals in corrals June 30, 1915.*

Stations.	American horses.	Native ponies.	Mules.	Police ponies.	Private animals.	Total.
Ancon	34	15	243	12	28	332
Corozal	3	2	26	0	0	31
Paraiso	8	6	31	4	9	58
Gatun	4	1	19	6	1	31
Cristobal	22	1	86	2	3	114
Total	71	25	405	24	41	566

EXHIBIT NO. 7.—*Value of material received during the fiscal year 1914–15 on requisitions.*

	1914						1915						Total.
	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	
Construction, operation, and maintenance:													
Lock operation and maintenance	$100,735.28	$52,164.12	$80,308.22	$74,868.41	$53,188.67	$41,445.68	$19,832.81	$4,407.68	$14,893.19	$9,874.36	$11,747.53	$3,580.06	$467,046.01
Terminal construction	32,515.68	105,131.04	78,510.46	72,318.29	71,670.08	53,350.73	64,980.99	85,549.24	180,747.33	303,551.72	190,323.90	230,892.83	1,469,542.29
Canal transportation	4,111.40	1,067.70	21.60	13,476.78	5,829.19	848,94	798.63	[1] 151.50	9,701.97	7,609.51	24,919.39	1,101.44	69,638.05
Electrical division	10,144.88	11,826.68	17,945.14	22,746.10	11,177.94	19,799.03	19,909.41	39,768.01	49,433.92	33,869.98	36,030.96	28,113.41	300,765.46
Dredging division	17,899.56	22,969.87	11,017.42	54,230.43	17,719.78	15,690.03	6,294.60	9,400.96	39,933.80	16,783.87	4,432.44	2,238.98	218,611.74
Mechanical division	65,205.24	25,276.16	73,452.43	44,100.63	64,928.50	44,356.95	10,886.99	11,391.20	66,824.96	6,106.05	7,612.96	17,902.60	438,044.67
Permanent buildings	24,396.59	28,646.58	31,747.70	11,327.19	30,713.06	15,920.21	18,821.79	14,879.60	17,553.49	19,406.56	40,901.23	28,485.63	282,799.63
Municipal engineering	25,902.59	50,967.35	11,326.81	46,698.10	188,417.79	15,580.75	19,299.89	8,717.98	8,142.18	3,912.45	17,674.12	8,339.71	404,979.72
Fortifications	69,171.70	75,587.18	24,334.89	39,820.13	7,886.14	8,092.38	2,231.35	24,164.33	38,966.17	5,176.27	8,094.59	9,744.38	313,269.51
Accounting department	1,085.21	2,546.12	2,470.40	4,633.97	1,478.35	....	....	3.50	3,671.36	2,358.21	170.85	3,603.15	22,021.12
Executive secretary	5,422.24	396.22	568.42	3,579.79	2,253.57	497.51	802.46	1,343.90	5,535.59	543.90	259.19	8,471.07	29,673.86
Meteorology and hydrography	....	....	....	....	18.00	140.45	....	4,100.00	49.49	....	....	249.10	4,557.04
Quartermaster's department (stock)	316,007.06	318,982.58	241,439.04	276,807.23	302,431.23	279,008.02	279,483.77	218,530.44	277,898.14	231,236.87	196,327.39	507,633.99	3,445,785.76
Total	672,597.43	695,561.60	573,142.53	664,607.05	757,712.30	494,730.68	443,342.69	422,408.34	713,351.59	640,429.75	538,494.55	850,356.35	7,466,734.86
Health department	7,161.94	8,744.67	1,183.06	3,013.23	2,255.30	690.19	1,096.29	411.47	3,526.33	3,429.36	467.71	678.70	32,658.25
Canal Zone government	109.74	324.33	409.02	304.91	662.72	11.59	30.06	4,920.24	1,092.15	1,632.13	175.71	246.19	9,918.77
Panama R. R. Co.	138,614.17	69,392.68	95,097.83	21,750.52	8,753.29	67,850.68	18,126.17	6,062.47	33,864.24	23,090.61	5,389.96	21,113.53	509,106.15
Grand total	818,483.28	774,023.28	669,832.44	689,675.71	769,383.61	563,283.14	462,595.21	433,802.52	751,834.29	668,581.85	544,527.93	872,394.77	8,018,418.03
Local purchases on the Isthmus:													
Coal purchased from Panama R. R. Co.	52,844.92	50,422.16	44,012.56	48,277.11	52,672.60	44,774.66	46,198.52	44,404.69	39,744.40	38,877.25	42,826.07	38,000.42	543,055.36
Miscellaneous purchases from Panama R. R. Co. (including commissary)	10,462.13	11,281.46	14,643.22	12,060.91	13,062.90	15,234.82	14,260.40	11,920.63	12,630.48	13,221.49	15,103.40	12,975.22	156,857.06
Crude oil purchased from Union Oil Co.	65,570.88	77,630.53	62,196.44	70,242.70	62,847.92	63,941.21	71,285.16	48,444.79	8,538.28	78,963.78	98.68	....	609,760.37
Miscellaneous purchases from local merchants	134.61	1,474.10	1,253.97	1,271.07	217.34	2,667.44	973.16	408.65	1,375.41	2,375.72	354.92	399.41	12,905.80
Postage stamps	129.00	....	155.00	....	2.50	....	10.00	79.36	....	....	....	20.34	396.20
Ice	7,994.79	2,764.81	3,195.29	3,169.37	2,268.52	1,951.70	2,701.86	2,729.07	2,760.61	2,585.77	3,488.13	1,885.00	37,494.92
Total local purchases on the Isthmus	137,136.33	143,573.06	125,456.48	135,021.16	131,071.78	128,569.83	135,429.10	107,987.19	65,049.18	136,024.01	61,871.20	53,280.39	1,360,469.71

[1] Mechanical division.

Division of canal transportation was superseded by the marine division during February, 1915; division of lock operation and maintenance superseded division of lock erection during July, 1914.

Statement of expenditures above does not include payments made directly through Washington office for dredges *Gamboa*, *Tavernilla*, and *Cascadas*, nor colliers *Ulysses* and *Achilles*.

EXHIBIT No. 8.—*Freight statement, fiscal year 1914–15.*

Steamship lines.	Number of steamers.	General cargo.	Lumber.	Ties.		Piling.	Total weight.	
		Pounds.	*Feet B. M*	*Pieces.*	*Ft. B. M.*	*Pieces.*	*Pounds.*	*Ton.*
Panama R. R. Co	70	[1] 250,990,000	36,791	....	....	....	250,990,000	125,495
Royal Mail Steam Packet Co	5	82,234	....	....	....	....	82,234	41
Atlantic & Pacific Steamship Co	2	300,000	1,986,056	....	....	....	300,000	150
Leyland Line	14	456,419	....	....	....	....	456,419	228
United Fruit Co. (New York)	91	27,263,786	....	....	....	....	27,263,786	13,632
United Fruit Co. (New Orleans)	105	14,444,573	9,007,454	6,636	296,131	2,904	19,600,334	9,800
Hamburg-American	5	109,456	....	....	....	....	109,456	54
Tramps, Atlantic	30	[2] 64,411,759	4,344,213	6,976	311,304	2,019	67,995,484	33,999
Tramps, Pacific	2	660,154	20,090	....	....	1,614	3,525,004	1,762
Pacific Mail	22	1,286,817	61,939	....	....	142	1,538,867	769
New York & Pacific	10	1,720,626	8,075,555	4,951	220,938	422	2,469,676	1,235
Luckenbach Steamship Line	21	6,111,661	615,594	....	....	106	6,299,811	3,151
Seeberg Steamship Line	17	37,856,793	2,534,152	6,978	311,393	2,099	41,582,518	20,791
Total	394	405,694,278	26,681,844	25,541	1,139,766	9,306	[3] 422,213,589	211,107

[1] Includes 203,433,006 pounds of cement, equal to 518,961¾ barrels.
[2] Includes 28,680,092 pounds of cement, equal to 73,163½ barrels.
[3] Includes weight of piling, approximately 8,261 tons.

EXHIBIT No. 9.—*Important items of material purchased from inception of canal work, 1904, to June 30, 1915.*

Articles.	Quantity.	Value.
Barges	50	$1,458,830.00
Boats, tugs	11	870,734.00
Brick, building, fire, and paving	....	428,574.14
Cableways	8	367,445.90
Cars	4,181	4,655,355.79
Cement ......barrels	6,947,793	[1] 7,719,863.38
Compressors, air	31	173,931.87
Cranes	113	1,172,144.81
Dredges	16	2,809,120.00
Drills, rock	725	288,376.59
Drivers, pile	6	53,966.00
Explosives:		
Dynamite ......pounds	60,510,989	7,255,427.26
Other blasting supplies	....	673,820.05
Forage and corral supplies	....	1,035,239.56
Furniture:		
Married quarters	....	271,025.74
Bachelor quarters	....	147,143.50
Hospital quarters	....	76,666.65
Laborers' quarters	....	208,809.00
	....	703,644.89
Live stock:		
Horses	....	39,212.50
Mules	....	131,939.44
Cows	....	13,106.02
	....	184,257.96
Locomotives:		
Steam	189	1,942,502.00
Electric towing	40	513,680.00
Lumber ......feet b. m.	295,456,643	7,484,007.24
Material for locks	....	14,487,954.65
Piling ......pieces	182,813	2,520,938.02
Plants:		
Gatun hydroelectric station, building and equipement	....	366,657.43
Power (3)	....	366,523.97
Material handling (3)	....	689,358.60

[1] Total value of cement as shown in last annual report does not extend the total cost at the rate charged under the contract, viz, $1.62 per barrel. Above amount corrects last report and includes this year's receipts extended at this price.

EXHIBIT No. 9.—*Important items of material purchased from inception of canal work, 1904, to June 30, 1915*—Continued.

Articles.	Quantity.	Value.
Plants—Continued.		
Rock crusher (4)		$200,164.68
Filtration (5)		181,409.77
Pumping (3)		61,513.73
Boiler (2)		114,961.00
Hydraulic dredging (1)		192,868.00
Steel foundry (1)		458,831.39
		2,632,288.57
Rails, steel	63,229	1,979,901.45
Roofing, corrugated-iron		553,602.25
Screening, wire		470,809.95
Shovels, steam	102	1,094,879.96
Spreaders, earth	26	139,687.00
Ties, cross and switch	2,332,308	2,002,402.69
Unloaders	29	158,839.00

EXHIBIT No. 10.—*Value of stock on hand at storehouses, June 30, 1915, and total issues for the year for all storehouses.*

Storehouse.	Total amount of issues.[1]	Stock on hand.
Dry dock	[2] $374,978.42	$268,120.53
Paraiso	813,203.22	523,981.51
Balboa	6,762,134.06	2,133,727.33
Mount Hope	5,652,848.27	[3] 1,273,910.31
Total	13,603,163.97	4,199,739.68

[1] Issues include surveys and sales from stock.

[2] Covers eight months' issues, other four being included in issues from Mount Hope.

[3] Includes stock of obsolete storehouse at survey value, amounting to $1,198,795.77.

EXHIBIT No. 11.—*Houses, apartments, and occupants, by districts, af gold and silver quarters, as of June 30, 1915.*

Districts.	Gold.		Silver.		Total.	
	Family.	Bachelor.	Family.	Bachelor.	Family.	Bachelor.
Ancon-Balboa:						
Houses occupied	233	53	55	40	288	93
Rooms or apartments [1]	493	644	425	118	918	762
Number of occupants	1,742	1,484	1,620	1,498	3,362	2,982
Corozal:						
Houses occupied	63	6	10	14	73	20
Rooms or apartments	160	20	32	16	192	26
Number of occupants	478	49	129	263	607	312
Paraiso-Pedro, Miguel-Gamboa:						
Houses occupied	120	28	143	43	263	71
Rooms or apartments	194	159	449	84	643	243
Number of occupants	643	359	1,350	813	1,993	1,172
Gatun:						
Houses occupied	59	9	39	8	98	17
Rooms or apartments	164	24	105	18	269	42
Number of occupants	520	65	323	179	843	244
Cristobal:						
Houses occupied	113	27	53	14	166	41
Rooms or apartments	319	326	174	14	493	340
Number of occupants	1,089	662	759	1,051	1,848	1,713
Total:						
Houses occupied	588	123	400	119	988	242
Rooms or apartments	1,330	1,173	1,185	250	2,515	1,423
Number of occupants	4,472	2,619	4,181	3,804	8,653	6,423

[1] Does not include 120 apartments (married) under construction. Does not include concrete bachelor quarters authorized (24 rooms).

NOTE.—The above tables includes 11 gold families living in box cars, and 13 apartments, housing 272 gold persons, in Culebra, Empire, Las Cascadas, and Bas Obispo.

Exhibit No. 12.—*Typewriters turned in to manufacturer, in part payment of new machines purchased, pursuant to section 5 of the general deficiency appropriation act, approved Mar. 4, 1915.*

Articles exchanged.			Articles purchased.	
Article and make.	Period of use.	Allowance.	Article and make.	Price, including exchange value.
Typewriter, Underwood	Apr. 1, 1905, to Apr. 28, 1915.	$20.00	Typewriter, Underwood	$67.50
Do	May 11, 1910, to May 18, 1915.	32.50	Typewriter, Royal Standard.	58.50
Typewriter, Remington	Sept. 18, 1912, to May 28, 1915.	35.00	Typewriter, L. C. Smith.	65.00
Typewriter, Underwood	Dec. 1, 1908, to May 27, 1915.	27.50	Typewriter, Underwood.	62.50
Typewriter, Monarch	Sept. 29, 1909, to June 24, 1915.	35.00	Typewriter, Monarch	108.50

Exhibit No. 13.—*Operation of Hotel Tivoli, July 1, 1914, to June 30, 1915.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operations.	Revenue.	Profit.	Loss.	Meals served.
1914.								
July	$6,934.41	$2,944.69	$2,322.85	$12,201.95	$11,986.46		$215.49	9,136
August	6,867.64	3,005.10	1,926.67	11,799.41	9,756.48		2,042.93	7,764
September	5,336.39	2,795.64	1,996.31	10,128.34	9,629.06		499.28	7,601
October	6,034.67	2,776.36	2,217.19	11,028.22	10,149.49		878.73	7,670
November	7,232.55	2,884.78	2,521.94	12,639.27	12,037.67		601.60	9,474
December	7,166.64	3,055.86	2,187.47	12,409.97	11,309.65		1,100.32	8,989
1915.								
January	7,353.74	3,176.94	2,023.02	12,553.70	12,808.05	$254.35		10,320
February	8,225.38	3,501.59	2,382.83	14,109.80	18,468.05	4,358.25		13,321
March	8,735.91	3,544.36	3,113.47	15,393.74	17,160.40	1,766.66		13,249
April	6,623.58	3,253.52	2,894.24	12,771.34	12,717.80		53.54	9,870
May	6,443.10	3,109.60	2,262.59	11,815.29	9,793.60		2,021.69	7,512
June	5,542.30	3,048.95	1,841.54	10,432.79	9,492.95		939.84	6,768
Total	82,496.31	37,097.39	27,690.12	147,283.82	145,309.66	6,379.26	[1] 8,353.42	111,674

[1] Net, $1,974.16.

Exhibit No. 14.—*Summary of operations of line hotels, July 1, 1914, to June 30, 1915.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operations.	Revenue.	Profit.	Loss.
1914.							
July	$44,978.55	$7,704.96	$1,839.70	$54,523.21	$55,395.08	$871.87	
August	44,777.81	7,756.61	1,820.63	54,355.05	55,153.93	798.88	
September	41,389.41	7,507.07	1,846.65	50,743.13	50,471.94		$271.19
October	42,115.51	6,842.69	1,697.50	50,655.70	49,678.79		976.91
November	35,176.06	6,179.29	1,571.20	42,926.55	43,222.38	295.83	
December	32,638.43	6,249.94	1,644.14	40,532.51	41,243.77	711.26	
1915.							
January	32,496.36	5,972.84	1,700.87	40,170.07	42,137.63	1,967.56	
February	29,356.99	6,039.60	1,987.04	37,383.63	38,714.99	1,331.36	
March	31,948.20	6,219.31	4,731.63	42,899.14	43,648.87	749.73	
April	29,539.43	5,865.33	3,260.58	38,665.34	39,194.18	528.84	
May	32,061.48	5,928.65	3,812.96	41,803.09	41,838.17	35.08	
June	32,297.62	5,799.44	1,406.03	39,503.09	40,155.05	651.96	
Total	428,775.85	78,065.73	27,418.93	534,160.51	540,854.78	[1] 7,942.37	1,248.10

[1] Net, $6,694.27.

EXHIBIT NO. 15.—*Summary of operations laborers' messes, July 1, 1914, to June 30, 1915.*

Month.	Supplies consumed.	Salaries and wages.	Miscellaneous expenses.	Total cost of operations.	Revenue.	Profit.	Rations served.
1914.							
July	$18,410.20	$2,193.40	$720.27	$21,323.87	$23,328.78	$2,004.91	58,322
August	15,639.43	2,071.61	704.55	18,415.59	20,004.69	1,589.10	50,011
September	14,603.13	1,933.42	744.34	17,280.89	18,071.56	790.67	45,178
October	15,219.20	1,592.75	725.26	17,537.21	18,354.67	817.46	45,886
November	14,492.41	1,477.66	785.52	16,755.59	17,788.62	1,033.03	44,471
December	14,569.56	1,402.61	667.36	16,639.53	17,959.84	1,320.31	44,900
1915.							
January	13,926.33	1,363.86	551.43	15,841.62	17,414.30	1,572.68	43,536
February	11,997.65	1,278.43	612.29	13,888.37	14,726.48	838.11	36,816
March	12,230.04	1,197.09	832.30	14,259.43	14,970.02	710.59	37,425
April	12,091.17	1,223.16	527.38	13,841.71	15,132.06	1,290.35	37,830
May	12,581.99	1,191.49	562.88	14,336.36	15,898.49	1,562.13	39,746
June	10,966.55	1,054.86	471.98	12,493.39	13,734.76	1,241.37	34,337
Total	166,727.66	17,980.34	7,905.56	192,613.56	207,384.27	14,770.71	518,458

APPENDIX G.

REPORT OF THE RESIDENT ENGINEER, BUILDING DIVISION.

Balboa Heights, Canal Zone,
July 14, 1915.

Sir: I have the honor to submit the following report covering the operations of the building division during the fiscal year ending June 30, 1915:

Organization.—During the period of the year from July 1 to October 1 the building division was continued under Resident Engineer Frank Holmes as a part of the organization of the supply department, headed by Capt. R. E. Wood, chief quartermaster. Effective October 1 the division was separated from the supply department and placed in immediate charge of Capt. Wood as constructing quartermaster, reporting direct to the Governor, following which the resident engineer resigned, effective November 18, 1914.

A general consolidation and reduction of force ensued, resulting in the work of the division being placed under the direct charge of Superintendents Fields and Haven for Army post construction at Fort Amador, and under Acting Superintendent Whitaker for canal structures in Balboa and vicinity. All other work remaining uncompleted at the northern end of the canal and at intermediate points was carried on under individual foremen reporting directly to the constructing quartermaster. Later the entire Army post work was placed under Superintendent Fields, and with certain other minor changes the organization continued as outlined until May 10, 1915.

Effective this date, Capt. R. E. Wood resigned and the position of constructing quartermaster was abolished. Simultaneous with this change, the writer was relieved from duty in charge of the division of municipal engineering and placed in charge of the building division as resident engineer.

Buildings authorized.—A general increase in building operations having been authorized at this time, the division was divided into five principal subdivisions or sections, viz, northern district, central district, southern district, Fort Amador district, and designs.

The northern district, in charge of James Cosgrove, superintendent, includes all work for both canal and United States Army from Frijoles north, including Toro Point and Margarita Island. The central district, under Superintendent E. Galliher, includes similar work in the territory Corozal to Frijoles. The southern district, under Superintendent R. W. Whitaker, embraces all work south of Corozal, including Ancon, Balboa, and vicinity. The Fort Amador district, under Superintendent J. B. Fields, covers the construction of post buildings for the Coast Artillery at Fort Amador and Naos Island.

The designing section is divided into two parts, architectural and engineering. Mr. Samuel Hitt, architect, is in charge direct of all architectural studies and details. Mr. T. C. Morris, assistant engineer, is in charge of the details and design of foundations, reinforced concrete, and analyses for size, dimensions of beams, columns, floors, etc.

At the commencement of the fiscal year there were under construction in all degrees of completion the following principal buildings: Administration building, hydroelectric stations, four substations, commissary warehouse, radio stations' buildings, twenty-seven 4-family and nine 2-family permanent quarters, mechanical shops' office building, fire station, two commissary buildings, and schoolhouse. All of these buildings were completed and occupied within the first half of the year, with the exception of the Balboa commissary, which was not turned over for occupancy until May, 1915.

New canal structures were authorized for construction and work was commenced during the year as follows: Eleven 4-family and two 2-family concrete permanent quarters, Balboa dispensary, locks' repair buildings, medical storehouse, oil-storage building, two fuel-oil pumping stations, two public garages, forage-storage building, public bathhouse, slaughterhouse, removal and reconstruction Ancon insane asylum at Corozal, dairy and farm buildings at Corozal; ten type 17, seven type 4, and fifteen type 14 framed quarters at Balboa and Ancon; one type 17 and one type 10 framed quarters at Corozal, and one type 14 framed quarters at Mount Hope; public stables and wagon sheds for Panama Railroad in city of Panama; Panama Railroad station at Corozal; ball-park stands; police headquarters, Balboa; reconstruction Y. M. C. A. clubhouse, Balboa; lightkeeper's house at Punta Mala; motor-car and motor-bus houses; Panama Railroad station at Balboa and Ancon; Colon hospitals.

In addition to the above a large number of framed quarters of different type were taken down at Culebra, Empire, Gatun, and other places, transported to Balboa, Ancon, and vicinity, and reerected either in their original design or under modified plans. A large number of such buildings embraced the largest type of official houses, including that of the Governor's. The total number of buildings of all types and classes thus taken down and removed to other localities amounted during the year to 55.

Authorization was given during the year for the construction of permanent quarters for housing the Coast Artillery and mobile troops stationed and to be stationed in the Canal Zone. Authority for this work was given in two congressional appropriations, one of $700,000 and one of $1,290,000. Work on the buildings provided for in the first appropriation was begun in October, 1914, and on those under the second appropriation in March, 1915. The following table gives the number, character, location, and degree of completion to June 30, 1915, of the buildings authorized:

FIRST APPROPRIATION.

Fort Amador, Coast Artillery:
1. Four barracks, concrete, completed.
2. Two 4-family quarters, hollow block, completed.
3. Three 2-family quarters, hollow block, completed.
4. One 1-family quarters, hollow block, completed.
5. Headquarters building, hollow block, completed.
6. Two 4-family quarters, noncommissioned officers, hollow block, completed.
7. One stable, concrete, completed.
8. One wagon shed, frame, completed.
9. Residence, commanding general, frame, completed.

Mobile Army—Las Cascadas, Empire, and Culebra:
10. Modifications of buildings transferred from canal, completed.
Gatun:
11. Modifications and new frame construction, completed.

SECOND APPROPRIATION.

Coast Artillery, Fort Amador:
1. Four barracks, concrete, 60 per cent completed.
2. Two 4-family quarters, hollow block, 60 per cent completed.
3. Three 2-family quarters, hollow block, 85 per cent completed.
4. Two 1-family quarters, hollow block, 95 per cent completed.
5. Three 4-family quarters, noncommissioned officers, hollow block, 99 per cent completed.
6. One storehouse, concrete, not started.

Naos Island:
7. One storehouse, concrete, not started.

Toro Point, Fort Sherman:
8. One storehouse, concrete, not started.
9. One stable, frame, not started.
10. One wagon shed, frame, not started.

Margarita Island:
11. Two barracks, frame, not started.
12. One 1-family, commanding officer, frame, not started.
13. Three 1-family, captain's quarters, frame, not started.
14. Eight 1-family, lieutenant's quarters, frame, not started.
15. Two 4-family, noncommissioned officers' quarters, frame, not started.
16. One headquarters building, frame, not started.
17. One storehouse, frame, not started.
18. One stable, frame, not started.
19. One wagon shed, frame, not started.
20. One water tank (200,000 gallons), concrete, 35 per cent completed.
21. One pump station (water and sewage), concrete, not started.

Corozal, mobile Army:
22. Modifications and alterations, canal buildings and new construction, 5 per cent completed.
23. Engineer stables and sheds, frame, 100 per cent completed.
24. Signal Corps stables and sheds, frame, 98 per cent completed.
25. Ambulance stables and sheds, frame, 99 per cent completed.
26. Cavalry stables and sheds, frame, 2 per cent completed.
27. Artillery stables and sheds, frame, 7 per cent completed.

General building operations.—Prior to October, 1914, the construction of the permanent concrete quarters and administration building was carried on under the same methods and scheme of gang organization as similar work is handled by construction companies in the States. Each building as designed seemed to call for work in at least nine different trades, viz, concrete men, bricklayers, metal lathers, plasterers, tile setters, carpenters, coppersmiths, plumbers, and painters. The men in these different trades were carried under general foremen as separate units and passed from house to house as the building during construction progressed through the different stages to completion. Many or all buildings of necessity were in course of construction at the same time, and, aside from the general head of the work, no individual foreman or other person was interested or could be held in any way responsible for the ultimate cost of the building. Such an arrangement seemed in the light of experience to be particularly open to question, in view of the fact that this service on the canal brought skilled workmen in the different trades 2,000 miles from home and into a Government service that, for some reason unexplained, lead many of them to feel that the amount of work to be accomplished in eight hours was only that absolutely necessary to keep them from becoming especially conspicuous examples of indolence. This of course applies in a greater measure to one or two certain trades rather than to others.

After November it was decided to attempt the construction of future buildings on what might be termed a single unit organization for each building. The construction of each building was put in charge of a foreman having had a general and diversified experience, and while the special trades were retained they worked under this foreman and were responsible to him for the amount of work accomplished while in his building. Total cost of the building was fixed, and special inducements were offered to keep below this figure. In order to induce economy and speed in another way certain special trade work, such as plastering and plumbing, was contracted for on the outside and the men were given to understand that unless the force account work was kept within reasonable cost the contract method would be extended gradually to all trades. As a further inducement a system of bonuses was put into operation, but for various reasons it was decided to discontinue this.

The methods and system first employed were perhaps the natural and logical ones in the absence of canal experience along these lines, but the resulting costs as compared with the second method seem to point conclusively that the conditions of service peculiar to the Isthmus required a change in system of some kind.

It is only fair to state, however, that a part of the apparent saving or reduction in cost is undoubtedly due to experience gained and to the natural improvement as men became more familiar with their particular class of work. The following tables give comparative data on costs for various types of construction:

Character of building.	Estimate.	Cost.	Cubic feet contents.	Unit cost.	Description of design.
Completed prior to November, 1914:					
20 four-family		$31,049.15	116,640	$0.266	Hollow concrete block walls; concrete floors; wood roof supporting Spanish tile; hollow block wall support floors.
8 four-family		24,208.47	116,640	.208	
9 two-family		16,154.24	67,734	.239	
Completed April, 1915:					
2 four-family	$22,500	20,422.00	116,640	.175	Similar construction to above.
3 two-family	15,000	14,599.00	86,300	.169	
2 four-family	12,000	11,816.00	73,688	.160	
4 barracks	43,000	32,356.00	337,410	.096	Poured concrete walls, veranda, columns, and girders; wood floors and roof with tile; softwood trim; wood partitions.
Cristobal commissary warehouse.	72,000	102,190.00	640,810	.159	Reinforced concrete; 250 pounds to square foot live load; 2-story.
Ancon medical storehouse	30,000	20,566.37	125,800	.163	Reinforced concrete; 1-story.
Oil-storage building, Balboa	33,000	28,962.00	252,225	.115	Do.
Ancon commissary	30,000	27,244.64	203,840	.134	Reinforced concrete columns, floors, and roof; block walls; 1-story.
Balboa commissary	90,000	145,264.00	562,671	.258	Reinforced concrete; 2-story; concrete block walls; caisson foundation.
Administration building		879,000.00	2,100,000	.418	Steel frame; concrete blocks; poured floors; Welch tile and mosaic; sawdust concrete roof with Spanish tile; cost exclusive shelving, decorative painting; vacuum cleaning apparatus.
4 substations		181,000.00	675,000	.278	Steel skeleton; hollow blocks; fireproof roof; mahogany trim.
Balboa fire station	15,000	17,762.95	61,832	.287	Reinforced concrete; hollow blocks; tile roof on wood rafters.
Balboa dispensary	14,300	15,300.00	61,390	.249	Do.
Mechanical shops office building.		120,363.00	542,000	.222	Steel skeleton and hollow blocks.

These unit costs, on the cubic-foot basis as given in the above table, show a wide range and it is believed give comparative costs that may lead to erroneous conclusions unless careful consideration is given to each individual building, its location, character of foundation, one or more than one story, and many other points of design which make for low or high unit costs in buildings. The costs as given for the two-family and four-family concrete quarters are an exception, however, as all these buildings are practically alike in all respects as to location and foundations. The average cost per cubic foot for the first lot of 28 four-family buildings is $0.245; for the second lot of 2 four-family buildings the cost is $0.175. The two-family buildings in the first lot ran $0.208 per cubic foot and in the second lot $0.169.

A number of both one, two, and four family buildings of similar design are now rapidly approaching completion and costs to date indicate that the figure of 16½ cents per cubic foot is as low as may reasonably be expected.

The division is called upon to estimate for and carry on a large number of diversified pieces of construction work for other divisions. A large part of this results from work requests issued by the supply department. All such work is carried unclassified and without detail on the cost sheets and aggregates from $25,000 to $30,000 monthly. The following table gives a typical list of such work constantly in progress. The estimate and resulting cost is also shown.

Project.	Estimate.	Cost.
Removal of Balboa quarantine station	$30,000.00	$23,197.54
Motor-car room, Balboa	4,000.00	3,061.26
Polic station, Balboa	12,000.00	11,190.59
Schoolhouse, Balboa	25,000.00	21,000.00
Panama R. R. stables, Colon	7,000.00	4,000.00
Ball park, Colon	1,500.00	1,455.00
Ball park, Pedro Miguel	2,400.00	1,891.00
Ball park, Balboa	500.00	492.00
Signal station, Empire	2,500.00	2,147.00
Moving of type 15, Balboa	650.00	600.81
Pump station, Gamboa	825.00	697.28
Fuel-oil plant, Balboa	7,000.00	4,675.90
Fuel-oil plant, Cristobal	7,000.00	3,675.90
Dairy building, Corozal	32,918.20	33,032.36
Removal of insane asylum	50,000.00	49,955.11
Removal of type 18, Miraflores	3,600.00	4,732.59
Removal of schoolhouse, Mount Hope	450.00	1,185.00
Balustrade, administration building, Balboa Heights	3,500.00	5,060.00
Repairs, Colon quarantine	5,100.00	6,214.00
Repairs to Cristobal Dry Dock store	1,555.00	1,567.00
Ancon Hotel changes	400.00	432.00
Ancon commissary changes	2,100.00	3,140.00

The manufacture of hollow concrete blocks was discontinued the latter part of 1914 and the plant was closed down until April, 1915. During this time the stock of blocks was nearly exhausted in certain sizes, a total of 230,000 blocks having been issued. It became necessary to renew manufacturing in April, and the plant has been operated continuously since that time.

The table following gives the size, number, and unit cost of blocks for the months of April, May, and June.

Months.	Size (inches).	Number.	Unit cost.	Total cost.
April	4 by 12 by 12	15,175	$0.0622	$943.92
	6 by 12 by 12	19,626	.0920	1,805.76
	8 by 12 by 12	18,701	.1296	2,423.43
Total		53,502	[1] .0967	
May	3 by 12 by 12	11,081	.0494	547.33
	4 by 12 by 12	26,612	.0608	1,617.79
	6 by 12 by 12	23,020	.0899	2,069.98
	8 by 12 by 12	17,825	.1266	2,257.53
	8 by 12 by 16	1,337	.1532	204.89
Total		79,875	[1] .0830	
June	3 by 12 by 12	2,849	.0604	172.06
	4 by 12 by 12	26,106	.0743	1,940.49
	6 by 12 by 12	13,002	.1099	1,429.59
	8 by 12 by 16	4,849	.1874	908.56
Total		46,806	[1] .0951	

[1] Average.

The average cost per block, as shown above, figures out at $0.0873 per block. This includes a plant arbitrary of $0.03, which, if deducted, places the net cost per block at $0.057.

Permanent hospital buildings.—Two of the largest building projects on which work was started in the latter part of the year were the first two wards for the Ancon Hospital system and the Colon Hospital building.

The plans for the Ancon buildings were well along and investigations of the foundations had been begun by June 30. Active construction will be commenced early in August, 1915, and the work laid out and carried on with a view to throwing the wards open for occupancy within eight months from that time.

The wards as designed embrace two buildings two stories in height, 40 feet in width by 138 feet in length, with a separate combined administration and service building located between them. This building will be 32 feet wide by 92 feet long, two stories in height.

A great deal of study was given to the design of these buildings in an effort to decide upon that form of composite construction that would make for economy and yet meet all the rigid requirements demanded by the health department as regards character of interior and exterior finish. It was finally decided to adopt veranda and main building walls of poured reinforced concrete and floors with clear span wall to wall across the building constructed of reinforced concrete and overlaid in either terrazzo, mosaic tile, or some composition flooring for finish. All intermediate walls 6 inches in thickness and over are also to be built in reinforced concrete. All walls having thickness less than 6 inches are to be laid in hollow cement block, plastered with two-coat cement and sand stucco troweled to a smooth dead surface. The concrete walls are to be rubbed and filled to a similar finish.

The health department demanded walls that should be both smooth and of sufficient hardness to withstand chipping at corners, cracking, or denting, and, further, that the treatment of the wall finish should be such that the wall could be washed with antiseptic solutions if necessary, without in any way injuring the finish.

It is proposed to meet these requirements with the cement walls as described, treated with chemical and painted with special paints as follows:

The walls will be first given two coats of a wash of sulphate of zinc, mixed in equal parts by weight of zinc and water. The effect of this wash is to neutralize or destroy the alkalinity of the hydrated lime which comes to the surface of the concrete wall as calcium hydroxide and changes the latter into a mixture of calcium sulphate and zinc oxide. This gives a surface that has no leaching effect on linseed oil. Two coats of flat-finish oil-mixed paint of any color desired will then be applied. On this will be placed as a final finish a third coat of enamel washable wall paint.

It can be shown that a concrete wall treated in this manner will cost far less per square than the usual three-coat hard-finish white plaster, sized and tinted to the color desired. The difference in cost between the two methods is estimated to be approximately $12 per square in favor of the painted wall, with the additional advantage gained of a harder and more durable surface.

The roofs of the buildings were to be constructed of wooden trusses carrying hard-burned clay tile, dark red in color, Spanish S type or pattern.

The Colon Hospital construction was commenced in June and at the end of the year the foundations for the first wing were in place.

This hospital, to provide accommodations for 50 beds, has been designed on the pavilion plan and embraces four distinct buildings interconnected by covered verandas. The central unit or administration building will be 45 feet wide by 53 feet 6 inches long. On the lower floor will be located general offices, library, record room, and on the second will be located main and auxiliary operating rooms and doctors' rooms. Extending at right angles from this building to right and left will be located the ward buildings, each 40 feet wide by 130 feet 6 inches and 120 feet in length. Directly in the rear of the administration building and distant 43 feet will be located the kitchens and dormitory building 41 feet wide by 83 feet long. All buildings will be two-story and of the same character of construction as adopted for the Ancon Hospital.

The location of the hospital on the Colon Flat necessitated special studies for foundations. It was decided to float the buildings practically on the surface of the coral sand, which was found within a foot or two of the ground level. The walls will rest on a thin reinforced concrete mat, designed so that not more than 400 pounds per square foot total dead load, plus 300 pounds total live load, will be developed on the foundations.

The following table covers the principal canal structures completed and under construction during the year:

Item.	Name of building.	Buildings.	Type.	Date completed.	Per cent completed June 30.	Cost.	Estimated cost.
1	Administration building.	1	Steel frame, hollow blocks, poured concrete.	September, 1914.	....	$879,000	....
2	Substations	4	Steel frame, hollow blocks.	December, 1914.	....	181,000	....
3	Four-family permanent quarters.	20	Hollow blocks, concrete floors.	September and October, 1914.	....	31,049	....
4	do	8	do	do	....	24,208	....
5	Two-family permanent quarters.	9	do	do	....	16,154	....
6	Four-family permanent quarters.	1	Hollow blocks, concrete floors, tile roofs.	May, 1915	....	20,000	....

Item.	Name of building.	Buildings.	Type.	Date completed.	Per cent completed June 30.	Cost.	Estimated cost.
7	Four-family permanent quarters.	2	Hollow blocks, concrete floors, tile roofs.		60		$21,000
8	do	2	do		55		21,000
9	do	2	do		30		21,000
10	do	2	do		25		21,000
11	do	1	do		35		[1]21,000
12	do	1	do		5		[1]21,000
13	Two-family permanent quarters.	2	do		90		15,000
14	One-family	10	Type 17, revised frame, corrugated-iron roof.		85		2,500
15	Four-family	4	Type 14, frame		85		[1]5,300
16	do	1	do		100		5,300
17	do	2	do		85		5,300
18	do	2	do		50		5,300
19	do	2	do		35		5,300
20	do	1	do		50		5,300
21	do	4	do		1		5,300
22	Two-family	1	Type 4, frame		85		5,000
23	do	6	do		45		5,000
24	Commissary warehouse.	1	Reinforced concrete.	January, 1915		$102,900	
25	Ancon medical storehouse.	1	do	do		20,560	
26	Ancon commissary	1	Reinforced concrete and hollow blocks.	August, 1915		27,244	
27	Oil-storage building	1	Reinforced concrete.	April, 1915		28,962	
28	Balboa commissary	1	Reinforced concrete and hollow blocks.	do		145,264	
29	Balboa fire station	1	do	do		17,762	
30	Balboa dispensary	1	do	do		15,300	
31	Office building, mechanical shops.	1	Steel frame, hollow blocks.	December, 1915		120,363	
32	Locks repair shop	1	Reinforced concrete, steel, and tile roof.	April, 1915		15,000	
33	Extension Miraflores powerhouse.	1	Reinforced concrete.		50		35,000
34	Forage storage building.	1	Frame	June, 1915		6,500	
35	Balboa garage	1	Frame, concrete floor.	do		3,500	
36	Ancon garage	1	do	do		1,750	
37	Bathhouse, Washington Hotel.	1	Concrete and blocks.	do		2,200	
38	Slaughterhouse, Cristobal.	1	Concrete, corrugated-iron roof.		85		6,000
39	Oil manifold building, Balboa.	1	Frame	do		1,500	
40	Oil manifold building, Mount Hope.	1	do	do		1,800	
41	Panama railroad stables.	1	do		5		25,000
42	Corozal railroad station.	1	Concrete and blocks.		95		15,000
43	Balboa Heights railroad station.	1	do	May, 1915		38,000	
44	Lightkeeper's quarters, Cape Mala.	1	Frame, type 17	June, 1915		2,000	

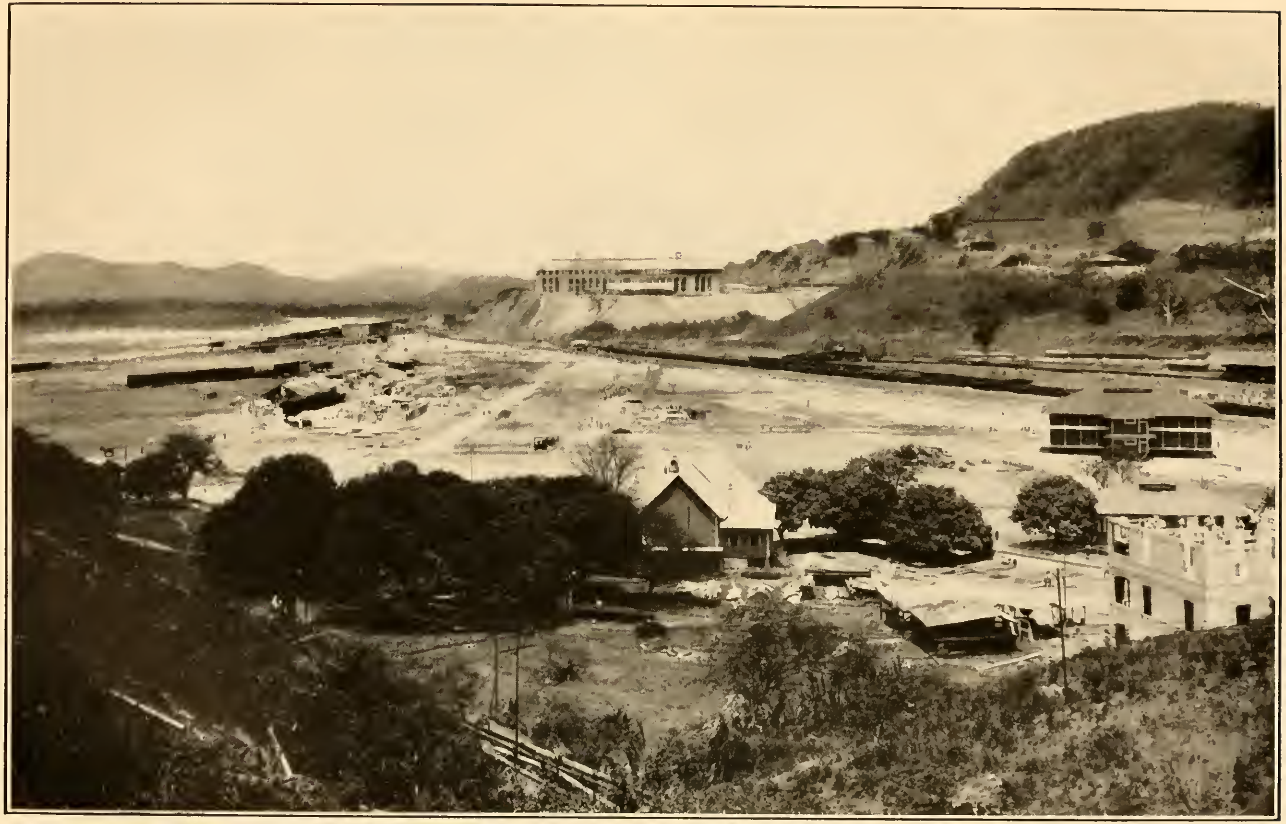
[1] Contract.

Force.—On October 1, 1914, the average daily force of the division was 4,050. By December 1 this force had been reduced to 2,300 men. On June 30 the force averaged 2,100 men; 166 men on the gold roll and 1,934 men on the silver roll.

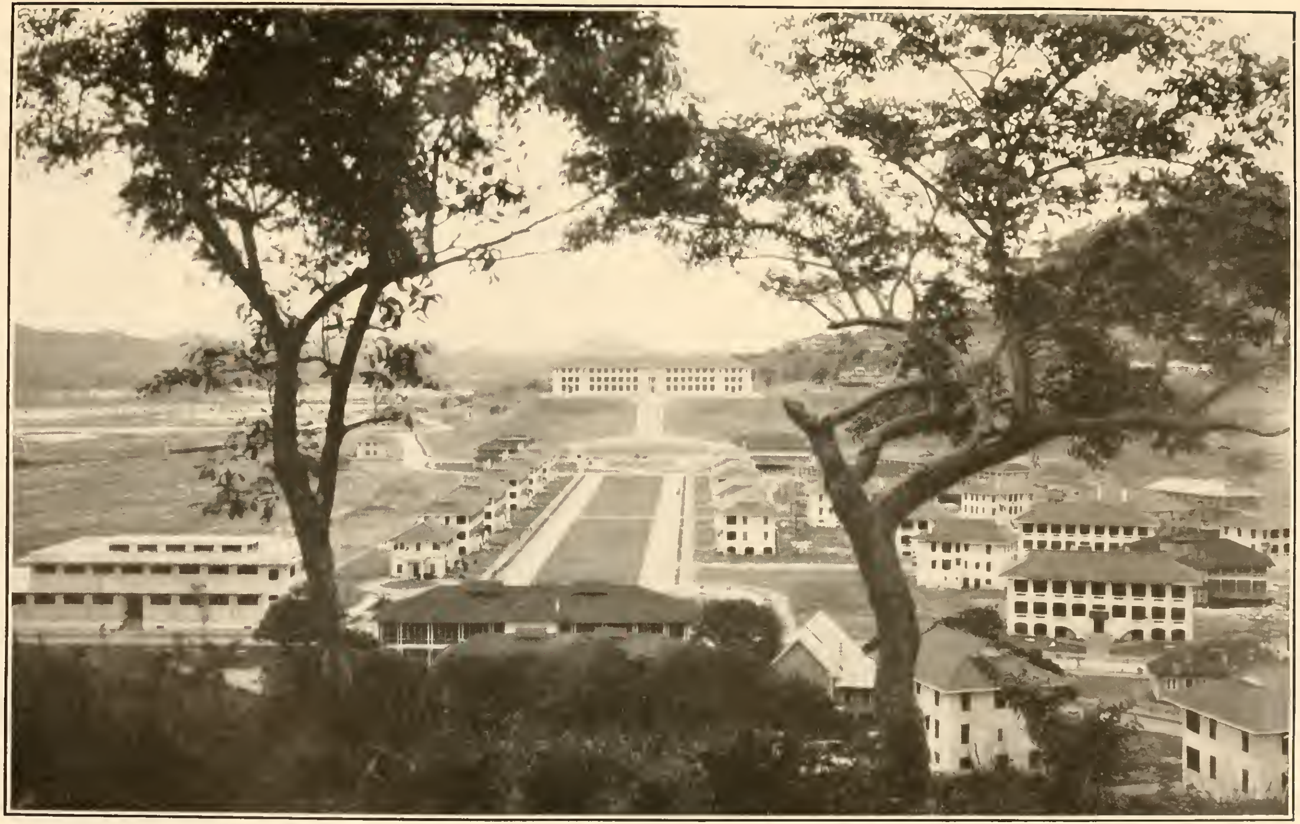
Respectfully submitted.

Geo. M. Wells,
Resident Engineer.

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

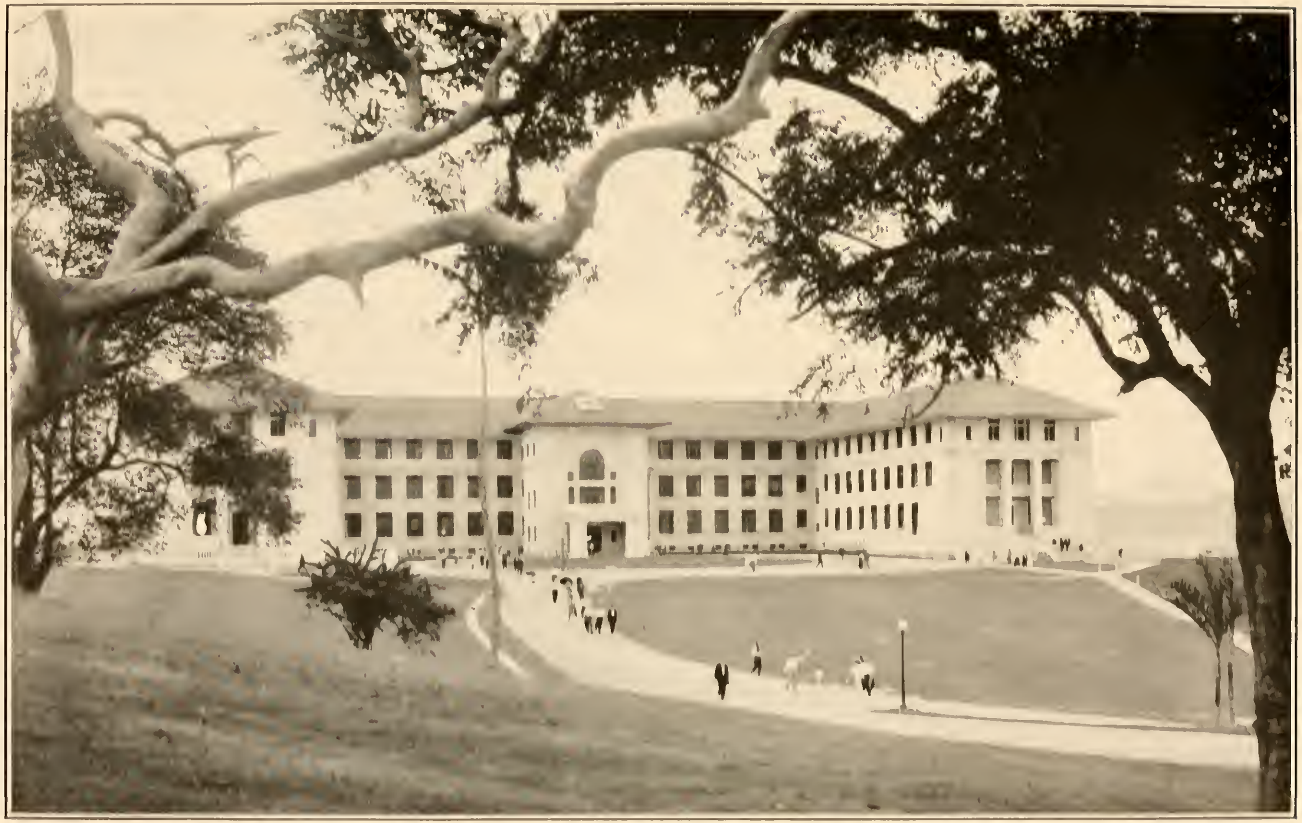


ADMINISTRATION BUILDING, BALBOA HEIGHTS, UNDER ERECTION. LOOKING NORTHWEST FROM SOSA HILL. MARCH 14, 1914.

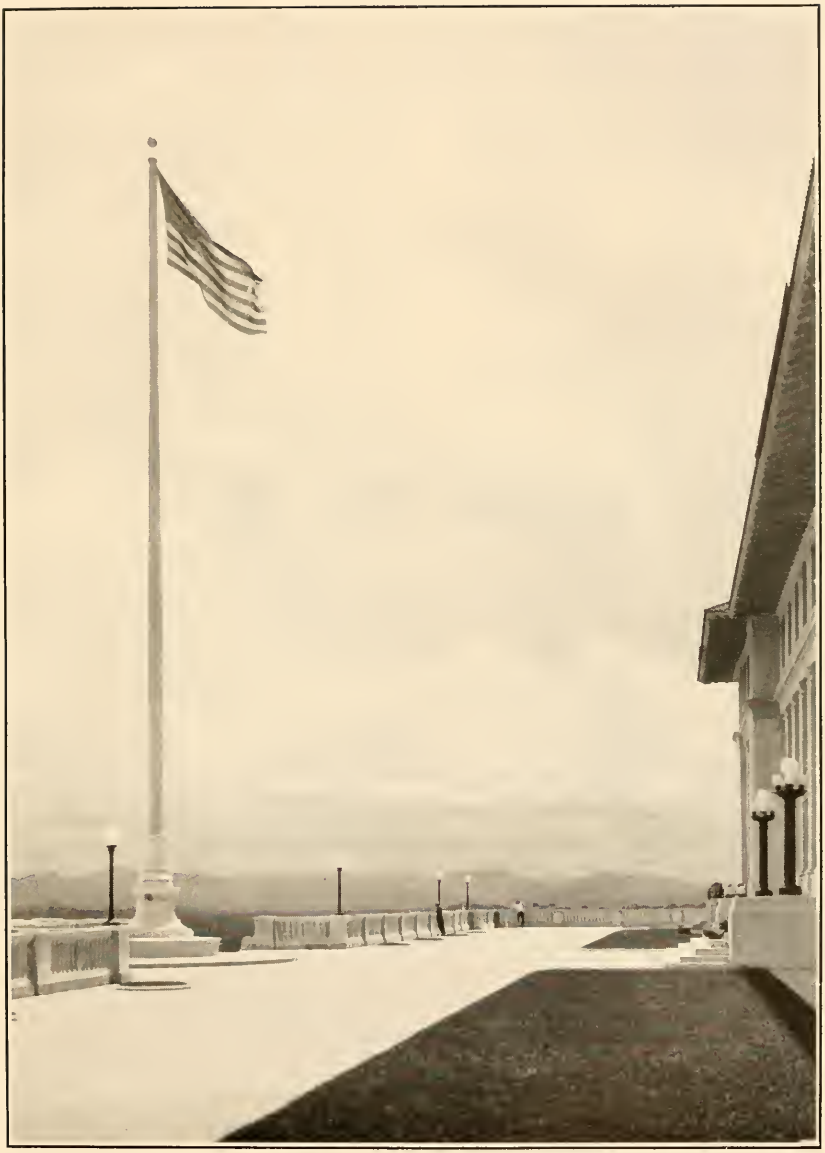


THE PRADO, BALBOA, AND ADMINISTRATION BUILDING, BALBOA HEIGHTS. LOOKING NORTHWEST FROM SOSA HILL. JUNE, 1915.

PLATE 68.

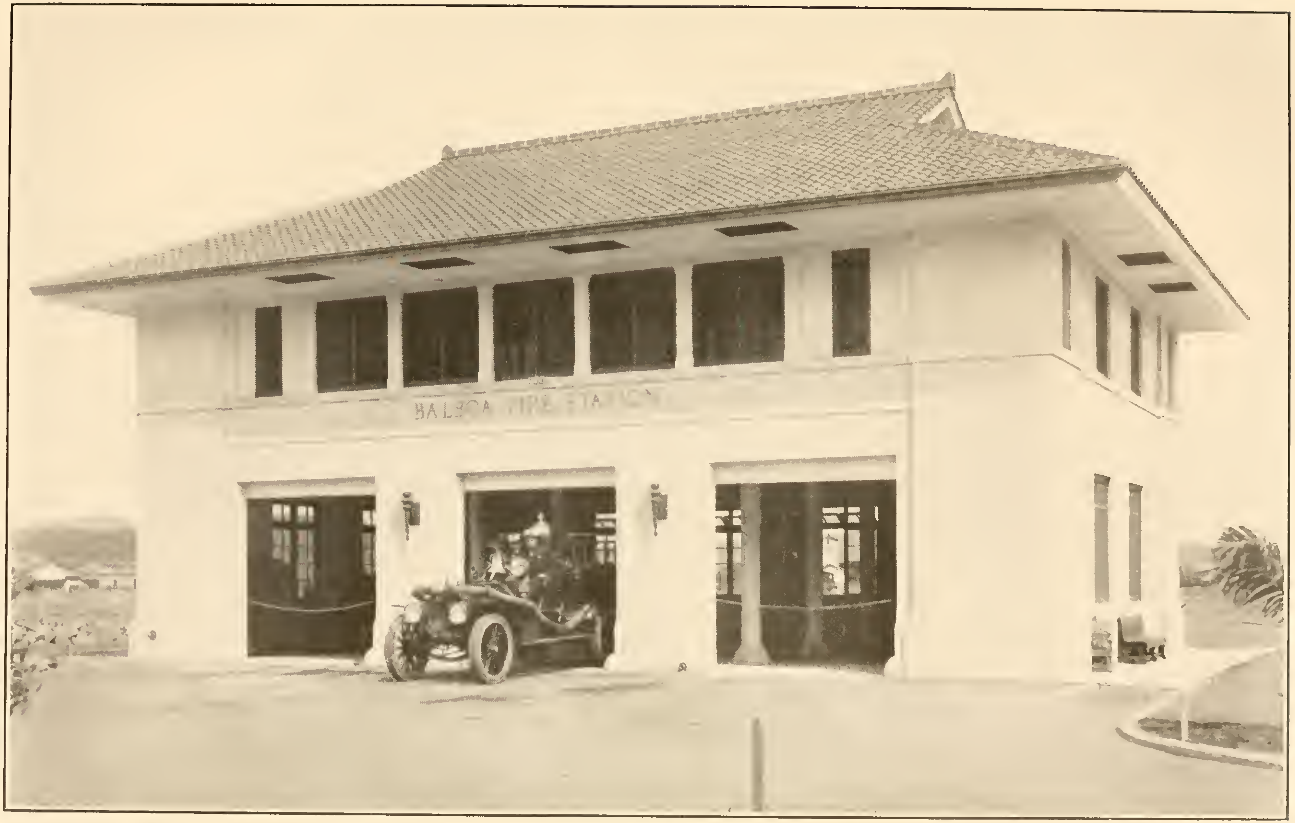


ADMINISTRATION BUILDING, BALBOA HEIGHTS. REAR VIEW. JUNE, 1915.

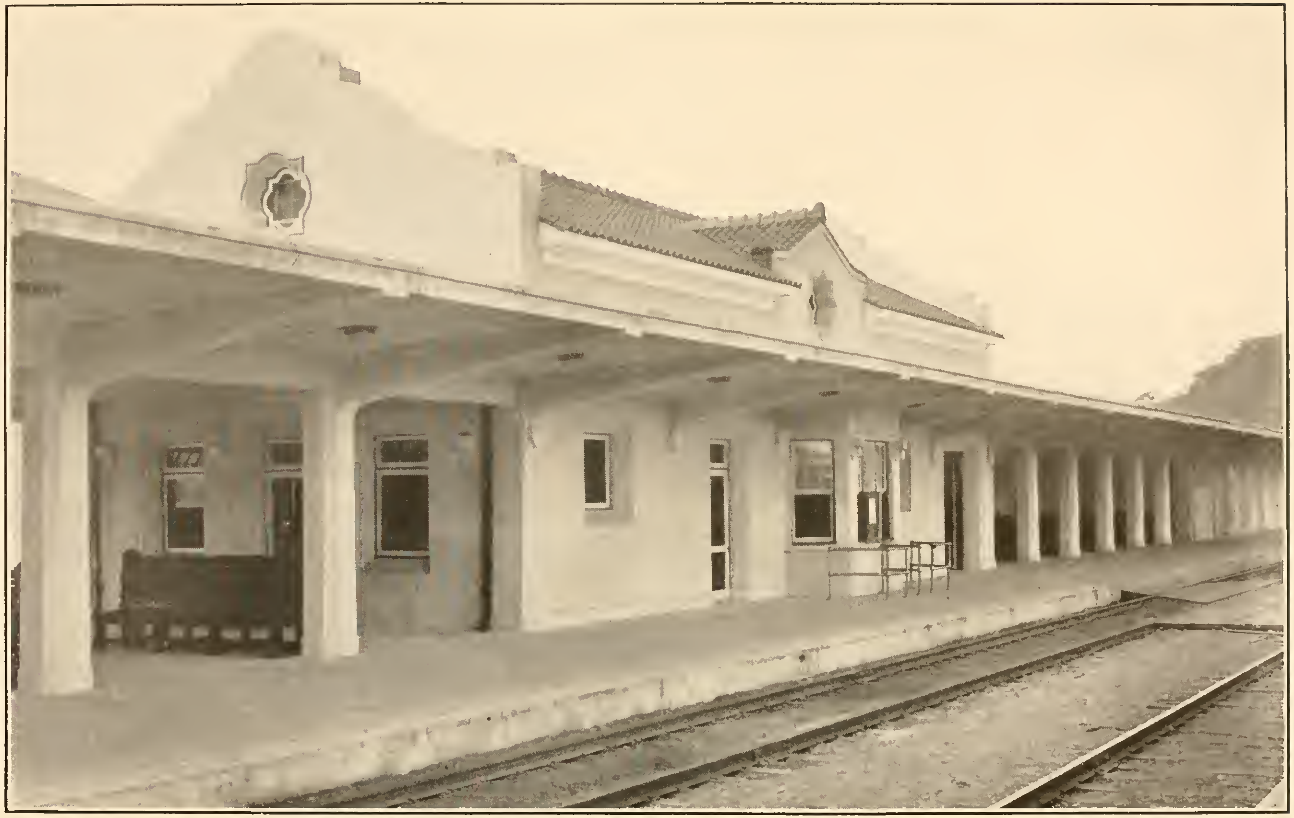


ADMINISTRATION BUILDING, BALBOA HEIGHTS. TERRACE AND CONCRETE FLAGPOLE. MAY, 1915.

PLATE 70.

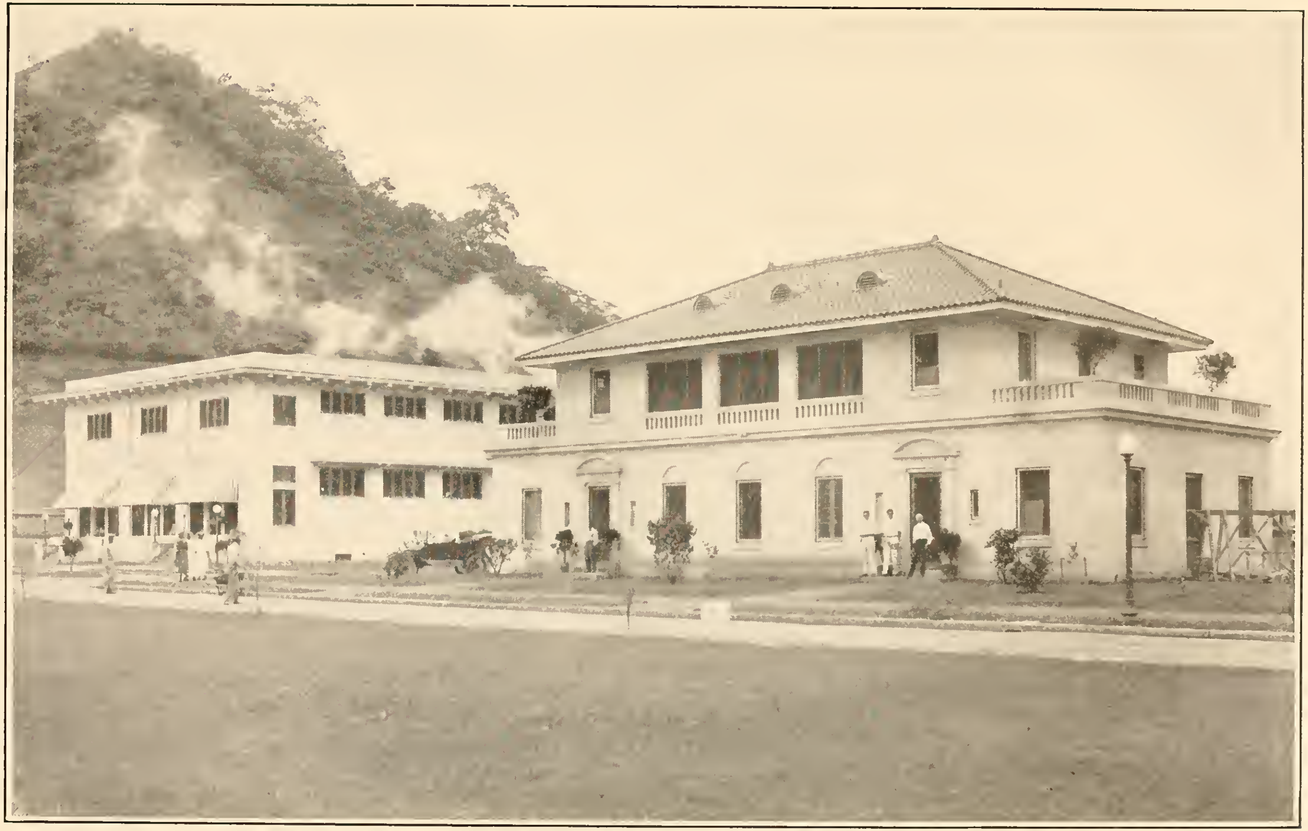


BALBOA FIRE STATION.



PANAMA RAILROAD STATION AT BALBOA. JUNE, 1915.

PLATE 72.



THE COMMISSARY (LEFT) AND DISPENSARY (RIGHT) AT BALBOA. JUNE, 1915.

APPENDIX H.

REPORT OF THE AUDITOR IN CHARGE OF THE ACCOUNTING DEPARTMENT.

Balboa Heights, Canal Zone, *September 15, 1915.*

Sir: I have the honor to submit the following report of the transactions of the accounting department for the fiscal year ending June 30, 1915:

ORGANIZATION.

Many changes took place during the first four months of the fiscal year, as the offices of the auditor, paymaster, and collector were moved from Empire, and the commissary accounting office and the offices of the local auditor and local treasurer of the Panama Railroad Company were moved from Colon and consolidated in the administration building at Balboa Heights. The department now consists of three main divisions—a division of accounting and auditing, under the immediate direction of the auditor; a division of disbursements, under the paymaster, Mr. John H. McLean; and a division of receipts, under the collector, Mr. T. L. Clear. The office of the department in the United States is in charge of the assistant auditor, Mr. A. L. Webb, during the temporary assignment of Mr. B. F. Harrah as special counsel and examiner of claims to investigate the claims of the McClintic-Marshall Construction Co., with Mr. Virgil C. Miller as disbursing clerk. Both the paymaster and collector have their main office at Balboa, with branch offices at Cristobal for the payment of bills and the collection of revenues. The accounting and auditing division is divided into the following bureaus and sections.

The accounting bureau, in charge of Mr. Ad Faure, chief accountant, includes the following sections and classes of work: General accounts, the keeping of the general books of The Panama Canal and the preparation of monthly and annual statements; costkeeping, the determination of costs of all work except the costkeeping for the shops operated by the mechanical division; commissary accounting, the accounting for commissaries operated by the supply department through the Panama Railroad Company; material and property accounting, accounting for stores and auditing of nonexpendable property records.

The auditing bureau is in charge of Mr. Elwyn Greene, chief examiner, and handles the work connected with the auditing of the accounts of collections made by 150 or more officers and collecting agents of The Panama Canal and Canal Zone, including the auditing of the post offices and money-order accounts and the accounts of clubhouses, the enforcement of the collection of all bills, and the counting of coupons turned in at the commissaries and hotels and the auditing of the accounts connected therewith. Mr. Greene acts as law clerk, and also has supervision of the time-inspection section, the duty of which is to check the correctness of time of employees as entered in the time books of The Panama Canal.

In the claims bureau, under Mr. J. H. Helmer, claim officer, is handled the examination and checking of all pay rolls of The Panama Canal and Panama Railroad Company, the preparation or audit of all vouchers and accounts payable, the handling of claims for shortages of freight shipped either on the railroad or on the steamship line, and the detailed handling of all claims arising under the injury compensation orders and acts.

The railroad accounting bureau was established in October, 1914, when the general offices of the Panama Railroad were moved to Balboa Heights, and the office of the local auditor of the railroad was consolidated with the accounting department of The Panama Canal, the position of local auditor abolished, and Mr. W. H. Kromer, chief clerk to the local auditor, was designated railroad accountant and placed in charge. The accounts payable, pay roll, and claims divisions were consolidated with similar divisions of The Panama Canal in the claims bureau, with a view of effecting a saving in the clerical force. The counting of commissary coupons and accounting for same was placed in charge of the chief examiner, and the cost-keeping formerly done in the local auditor's office was transferred to the costkeeping section of The Panama Canal. The railroad accounts bureau comprises the ticket accounts, station accounts, accounts receivable, bookkeeping, and the preparation of statistical data. The railroad accountant has direct supervision of this bureau and general supervision over all accounting and auditing in connection with the railroad.

In addition there is a bureau of traveling inspectors or auditors whose duty it is to check all cash accounts on the Isthmus, and a small section of files and mails, reporting direct to the auditor.

A section of the work that has afforded great satisfaction is the one that has charge of checking the pay rolls of the canal and the railroad. In my last annual report I called attention to the change in procedure in connection with the auditing of pay rolls which was begun May 1, 1913, under which effect was given to the provision contained in the legislative, executive, and judicial appropriation act approved August 23, 1912 ,that "disbursing officers shall make only such examination of vouchers as may be necessary to ascertain whether they represent legal claims against the United States." By the change which was made involving a reduction in expense to The Panama Canal of $20,000 per annum, the entire responsibility for the correctness of the rolls was assumed by the auditor's office. Returns from the Auditor for the War Department covering the period May 1, 1913, to February 28, 1915, have been received. A total of 752,500 items have been checked and passed during this period, involving a total amount of $29,888,526.50. During that period a total of 69 pay roll items, in amount $1,108.90, were suspended by the Auditor for the War Department. Of these items 39 only constituted actual overpayments, amounting to $231.99. Collections on account of these overpayments have been made from the employees overpaid in all except 16 cases, on account of which employees of the auditing office have been required to pay $71.14. This is the amount which should be compared with the actual saving to The Panama Canal of about $40,000 during the period in question. During the last six months for which statements have been received from the Auditor for the War Department not a single overpayment has been reported that had not previously been adjusted.

PAYMASTER.

The organization of the office to handle disbursements of funds for The Panama Canal as outlined in the last annual report was continued during the past year practically without change, the disbursements being made by the paymaster, Panama Canal. On October 14, 1914, the making of disbursements for the Panama Railroad Company on the Isthmus was taken over and the position of local treasurer, Panama Railroad Company abolished. On April 27, 1915, the Commercial National Bank, of Washington, Panama Branch, was designated by the board of directors of the Panama Railroad Company as depositary on the Isthmus for about $200,000 of Panama Railroad funds. The account was opened with the bank on that date and payments of bills to local merchants and others have been made by check on the local bank. Checks on local banks have been found to be a great convenience to local payees. Interest on Panama Railroad deposits with the Commercial National Bank, Panama, amounted to $687.40 from April 27 to June 30. The reduction in the number of silver employees has apparently created a surplus of Panamanian pesos, and it may be found necessary very shortly to make some arrangements for reducing the quantity in circulation in order to prevent the necessity of holding a supply in the vaults of banks or the offices of The Panama Canal. Table 25 is a tabulation of payments made by the paymaster for the past fiscal year, giving a total of $26,839,125.94.

COLLECTOR.

The office of collector was created on April 1, 1914, as a division of the permanent organization of The Panama Canal, as it was anticipated that upon the opening of the canal the making of collections from ships using the canal would become a very important feature of canal operations. In order to handle the business of vessels arrangements were made whereby deposits could be made with the Treasurer or an Assistant Treasurer of the United States or directly with the collector on the Isthmus. The special deposits made on the Isthmus for the fiscal year ending June 30, 1915, amounted to $2,852,798.62, of which $2,588,304.59 were applied to the payment of bills of The Panama Canal, $197,191.86 to the payment of bills of individuals and companies, including the Panama Railroad, and $52,578.14 refunded to depositors. Special deposits made in Washington amounted to $2,248,752.22, of which $1,756,044.03 were applied to the payment of bills of The Panama Canal, $191,120.67 to the payment of bills of individuals and companies, including the Panama Railroad, and $167,285.80 refunded to depositors. On October 16, 1914, the collections of the Panama Railroad were transferred to the office of the collector, thereby materially increasing the total amount handled. The disbursements made by the collector, mainly from Canal Zone and trust funds, amounted to $3,972,922.56. From

March 1 to June 1, 1915, rent was collected from all employees. The amount collected per month, over $25,000, while relatively, small, was made up of small items and required much extra work which, however, was handled without increasing the personnel.

ACCOUNTING TO THE TREASURY FOR COLLECTIONS.

Section 3 of the sundry civil act of March 3, 1915, provided that in prescribing the regulations governing the rendition of collection accounts under section 5 of the sundry civil act of August 1, 1914, the President should provide in lieu of furnishing individual detailed collection vouchers for small items that two employees, one from the office of the Auditor for the War Department and one from the office of the Comptroller of the Treasury, should be detailed semiannually to make an examination of the collection accounts on the Isthmus. The regulations authorized by section 5 of the sundry civil act of August 1, 1914, have been prescribed by Executive order of February 4, 1915 (Panama Canal circular 601–39). Two employees have been detailed by the Comptroller of the Treasury to perform this duty and have made the examination for the first period from January 1 to June 30, 1915.

CLAIMS FOR DAMAGES TO VESSELS PASSING THROUGH THE LOCKS.

Section 5 of the Panama Canal act authorized the President to make regulations governing the operation of the canal and provided that—

> Such regulations shall provide for prompt adjustment by agreement and immediate payment of claims for damages which may arise from injury to vessels, cargo, or passengers from the passing of vessels through the locks under the control of those operating them under such rules and regulations. In case of disagreement suit may be brought in the district courts of the Canal Zone against the Governor of The Panama Canal. The hearing and disposition of such cases shall be expedited and the judgment shall be immediately paid out of any moneys appropriated or allotted for canal operation.

The regulations governing the allowance of claims of this character were included in the Executive order of July 9, 1914 (Panama Canal circular 601–17, sections 57–61). Under these regulations six claims for damages to vessels while passing through the locks have been allowed and paid, the largest claim being for $1,055.19 and the smallest for $20, amounting to a total of $1,878.45. Other claims for damages of this character are now pending and will be settled in due course of business. It has been possible to adjust and settle by mutual agreement all claims of this character which have been presented without recourse to the courts as authorized by the Panama Canal Act.

CLAIMS FOR REFUND OF TOLLS.

The rules for the measurement of vessels passing through The Panama Canal were prescribed by Executive order of November 21, 1913 (Panama Canal circular 601–2). For several months after the canal was open for traffic tolls were assessed in accordance with this Executive order. On complaints filed by the owners of steamships passing through the canal, the question was submitted to the Attorney General, who held that under the Panama Canal Act the amount of tolls assessed could not exceed $1.25 per ton based on the United States net registered tonnage as prescribed by United States statutes.

On a large number of vessels passing through the canal the tolls assessed on the basis of the rules for the measurement of vessels prescribed by Executive order of November 21, 1913, at the rate of $1.20 per ton, exceeded the amount of tolls which would have been collected had such tolls been assessed at $1.25 per ton based on United States net registered tonnage. Under the Executive order tolls were also assessed on deck loads. The Panama Canal Act as construed by the Attorney General does not authorize the collection of tolls on deck loads if in excess of the maximum charge based on United States net registered tonnage.

A large number of claims have been filed for refund of excess tolls collected. The question as to the right of The Panama Canal to make such refunds was submitted to the Comptroller of the Treasury, who, in a decision dated April 1, 1915, held that there was no authority of law to use existing canal appropriations for that purpose, and that there was no authority of law to make such refunds from amounts collected as tolls.

The claims presented are now being examined, and when such examination has been completed, so as to show the amount which should have been collected in each case, the claims will be submitted to the Congress with the recommendation that an appropriation be made for refund of the excess collected.

CANAL APPROPRIATIONS.

Congress has appropriated for the canal, including fortifications, a total of $394,399,149.02 to June 30, 1915. Of this amount $14,689,873.30 were for fortifications; $750,000 to cover three annual payments of $250,000 each to the Republic of Panama for Canal Zone rights; $6,000 for the expense of presenting the steam launch *Louise* to the French Government; $6,440,000 were appropriated for the operation, maintenance, sanitation and civil government of the canal and the Canal Zone for the fiscal year 1916; while $4,289,159 were used for operating and maintaining the canal to the end of the fiscal year 1915. Of the amount of material in quartermasters' storehouses ($3,284,244.35), it is estimated that about $2,225,000 will be required for the permanent stock of material and supplies, etc., for the operation and maintenance of the canal. Deducting these amounts from the total appropriated leaves $365,999,116.72 which has been appropriated for the construction of the canal and its adjuncts. Of this amount $2,000,000 appropriated for colliers were specially exempted by law as a charge against the bond issue, so that the net amount chargeable to the authorized bond issue of $375,200,900 is $363,999,116.72, leaving a balance of $11,201,783.28 available for appropriation within the limit of cost of the canal and authorized bond issue. Up to June 30, 1915, there were collected $6,563,067.88 to be returned to the Treasury as miscellaneous receipts other than collections on account of tolls. This amount deducted from the available appropriations for construction, namely, $365,999,116.72, leaves $359,436,048.84 as the amount expended for the canal less the amount available for work provided for at the end of the year. The total cost of the canal and its adjuncts will be reduced by receipts from the sale of construction material and equipment, and payments by the Republic of Panama for the amount expended in the cities of Panama and Colon on account of waterworks, sewers, and pavements. Credit should also be given for the value of buildings and other public works and equipment and plant transferred to the Army and the Alaskan Railway Commission without any actual payment therefor. The general balance sheet to June 30, 1915, is published as table No. 2.

There are two items of loans standing against the Panama Railroad Company—one a loan to enable the company to re-equip its line, $1,399,114.61; the other to enable the company to take up its first mortgage bonds, $1,848,217.50—a total of $3,247,332.11. By section 2 of act of Congress of March 4, 1911, it was provided that the company should not make any further payment on the principal or interest on the notes given to the United States for moneys appropriated for its use. As a result, the company has been enabled to construct docks at Cristobal to a value which about equals the amount of the loans. Authority should be obtained to take over these docks in payment of the loans.

Under the agreement with the Republic of Panama, which requires the reimbursement of the United States for expenditures connected with the construction, operation, and maintenance of waterworks, sewers, and pavements in the cities of Panama and Colon, the expenditures to June 30, 1915, in Panama were $1,879,282.75, and in Colon $1,744,318.87, a total of $3,623,601.62, including accrued interest to date at the rate of 2 per cent per annum on the capital cost balances and on the proportionate cost of waterworks in the Canal Zone used for supplying water to the two cities based upon the quantity of water consumed. For the work in Panama this interest has amounted to $217,310.37, and for the work in Colon $172,260.76, a total of $389,571.13. There have been reimbursed to the United States $1,480,579.36, leaving a balance of $2,143,004.26 still due.

There were classified as "Construction of canal" $328,359,038.81 (Table No. 3), the direct cost of the main units of work included therein being:

Prism excavation from Gatun to the sea, $8,988,643.79, the principal items of work being: Dry excavation of 2,181,998 cubic yards at an average division cost of $0.5775, and dredging excavation of 39,044,914 cubic yards at an average cost of $0.1977.

Gatun spillway, $3,135,523.50, the principal item of work being 1,544,202 cubic yards of dry excavation at an average cost of $0.6145 per cubic yard, and 231,179 cubic yards of masonry at an average cost of $7.5010 per cubic yard.

Gatun dam, $7,538,000.81, the princiapl items of work being 12,229,104 cubic yards of dry fill and 10,728,965 cubic yards of hydraulic fill at an average cost of $0.3847 and $0.2466 per cubic yard, respectively.

Gatun locks, $28,294,706.26, the principal items of work being 4,660,055 cubic yards of dry excavation and 1,756,977 cubic yards of dredging excavation at an average cost of $0.6040 and $0.2821 per cubic yard, respectively. In addition thereto 228,376 cubic yards of dry excavation were removed in the preparation of foundations at an average cost of $1.7724 per cubic yard. In construction of the locks there were laid 2,041,240 cubic yards of masonry, and in the installation of machinery 26,734 cubic yards at an average cost of $7.0353 and $12.8209 per cubic yard, respectively. In filling back of the lock walls 2,119,406 cubic yards of material were used, and in filling the center wall 113,163 cubic yards at an average cost of $0.5160 and $0.7692 per cubic yard, respectively. The gates and fender chains cost $2,840,736.70, the emergency dams $928,531.01, and the operating machinery $3,054,611.77.

In the Colon west breakwater 1,276,479 cubic yards of material were placed at an average cost of $2.6201 per cubic yard. To the end of the fiscal year $1,561,674.39 had been expended in the construction of the east breakwater. Detailed cost of this work is shown in Table 15.

In prism excavation from Gatun to Pedro Miguel $81,790,417.17, the principal items of work being the removal of 110,261,883 cubic yards of material by dry excavation, 5,954,149 cubic yards by dredging, and 1,633,647 cubic yards by monitors, at an average cost of $0.7127, $0.4550, and $0.2098 per cubic yard, respectively. Dry excavation in this section was completed prior to this fiscal year, and the increase in units cost from $0.7066 per cubic yard shown in last year's annual report is due to various adjustments in the account.

Prism excavation from Pedro Miguel to the sea, $13,551,801.27, the principal items of work being the removal of 4,819,969 cubic yards of dry excavation, 40,661,517 cubic yards of dredging, and 1,549,904 cubic yards by monitors, at an average cost of $0.6449, $0.2304, and $0.6937 per cubic yard, respectively.

Pedro Miguel dams, $341,616.62, the principal item of work being 699,518 cubic yards of dry fill, at an average cost of $0.4499 per cubic yard.

Pedro Miguel locks, $12,309,079.34, the principal items of work being 1,133,280 cubic yards of dry excavation, at an average cost of $0.7985 per cubic yard, in addition to which 175,987 cubic yards were removed in the preparation of foundations, at an average cost of $2.4446 per cubic yard. There were laid in the construction of the locks 907,175 cubic yards of masonry at an average cost of $5.4908, and in the installation of the operating machinery 21,433 cubic yards, at an average cost of $12.0352 per cubic yard. There were used in back filling the lock walls 834,288 cubic yards of material and in filling the center wall 220,768 cubic yards, at an average cost of $0.4362 and $0.4777 per cubic yard, respectively. The lock gates cost $1,689,616.13, the emergency dams $937,958.48, and the operating machinery $1,843,492.45.

Miraflores east dam and the spillway, $1,026,134.05, the principal items of work being the excavation of 242,399 cubic yards of material, at an average cost of $1.2502 per cubic yard, and 74,254 cubic yards of masonry, at an average cost of $6.1681 per cubic yard.

Miraflores west dam, $901,759.62, consisting principally of 1,758,423 cubic yards of dry fill, at an average cost of $0.4564 per cubic yard.

Miraflores locks, $18,036,651.53, the principal items of work being the removal of 2,222,582 cubic yards of dry excavation, 309,647 cubic yards of dredging, and 332,703 cubic yards of hydraulic excavation, at an average cost of $0.8139, $0.4172, and $0.5486 per cubic yard, respectively. In addition thereto there were excavated 415,981 cubic yards of material in the preparation of the foundations, at an average cost of $1.7182 per cubic yard. There were laid in the construction of the locks 1,479,739 cubic yards of masonry, at an average cost of $4.9991, and in the installation of the operating machinery 28,781 cubic yards, at an average cost of $11.7963 per cubic yard. There were used in filling back of the lock walls 2,366,252 cubic yards of material and in filling the center wall 249,457 cubic yards, at an average cost of $0.3907 and $0.5486 per cubic yard, respectively. The lock gates cost $1,927,105.25, the emergency dams cost $833,842.33, and the operating machinery $2,457,171.22.

There had been expended on the proposed locks and dams at La Boca $565,684.33 prior to the time that they were abandoned and the lower Pacific locks located at Miraflores.

Naos Island breakwater, $790,718.55, the work consisting of 2,087,745 cubic yards of filling, at an average cost of $0.3787 per cubic yard. This, however, does not represent the real cost, as the material was taken from the dry excavation in Gaillard Cut, and no charge was made to the breakwater except the cost of trestle and the excess cost of dumping.

Aids to navigation cost $409,586.15, details of which appear in Table No. 16.

The power producing and transmitting system, including the hydroelectric plant at Gatun, the steam electric power plant at Miraflores, the transformer substations, and the transmission and duct lines, cost $3,520,277.54. To this amount will be added the appraised value of the machinery in the Miraflores plant, the cost of which has been absorbed in the construction work, as it was not anticipated that this plant would be used permanently. Detailed cost of the transformer substations and duct lines appears in Table No. 17.

There have been charged to the Atlantic terminals $2,390,000.88. Of this amount $2,189,423.14 is the cost to date of the Cristobal coaling and fuel-oil plants, detailed cost of which appears in Table No. 18. The concrete dock at Gatun cost $7,528.64. In addition thereto this account has been charged with the appraised value of the Cristobal dry dock, shops, and roundhouse, which had previously been absorbed in the construction costs, corresponding credit having been given thereto.

There have been expended on the Balboa terminals $11,038,808.61, detailed costs of which are shown in Table No. 19. This amount includes the cost of the concrete dock, which is the property of the Panama Railroad Company, but is being operated by The Panama Canal—$389,314.69.

There have been expended in the preparation of the permanent townsites $1,263,094.50, detailed costs of which appear in Table No. 20. This charge includes the cost of water and sewer mains and roads, as these utilities were estimated for under this head. When the work is completed the expenses pertaining thereto will be transferred to the proper asset accounts.

The cost of buildings is shown as $5,089,845.37, details of which appear in Table No. 21. This amount includes the appraised value of buildings which will be used permanently for the operation of the canal and which were formerly carried under "general items."

There are charged to sanitary fills $315,717.59, being expenses incurred primarily for sanitary reasons, but which are useful to the completed canal.

There were expended on the Colon-Cristobal waterworks system $582,644.54; on the Panama-Gamboa system $1,586,514.75, and on other Zone systems $538,606.13. Detailed costs of the Panama-Gamboa system are shown in Table No. 22. The item appearing under "other Zone systems" is the appraised value of the systems built during the construction of the canal, but which will be used permanently.

There have been expended on Zone sewerage systems $67,194.26 and on Zone roadways $543,357.54. These amounts are the appraised value of these utilities formerly carried under "general items" but which will be used permanently. There have been paid for real estate $1,569,834.83.

There have been classed as "miscellaneous" $58,731,803.32, being principally the cost of the relocated line of the Panama Railroad, the original concession from the Republic of Panama, and the amount paid the French company for the canal rights.

The amounts quoted above represent the direct cost to the divisions performing the work. In addition thereto, administrative and general expenses and the expenses of civil government and health have been prorated to the various units of construction, as well as various items which appear in last year's annual report under the head of "general items." A list of these items and a synopsis of their distribution is shown in Table No. 63.

With the completion of the canal it was decided to set up an account representing the value of the equipment and tools in use, crediting back their appraised value to the accounts originally charged. Considerable difficulty has been experienced in securing inventories of this property, and to the close of the fiscal year only a portion of the equipment and tools in use has been set up. Details of the items entering into the account "equipment and tools" are shown in Table No. 4.

The total value of material, supplies, and equipment in quartermasters' storehouses, as determined from inventory taken on June 30, 1915, was $3,284,244.35. In addition thereto there was obsolete or surplus material to the value of $611,838.35, and the construction and operating divisions had on hand material not yet charged to any unit of construction or operation, to the value of $433,120.51; and there were containers in transit returned to contractors for credit to the amount of $45,656.89.

During the fiscal year 1915 there were expended in the maintenance and operation of The Panama Canal $4,123,128.09, the main items of expense being $1,769,475.59 for dredging, principally due to slides at Culebra, and $1,380,405.53 for a proportion of charge of the expenses of civil government, health department and administration, details of which appear in Table No. 62. For further details of cost of operation and maintenance, reference is made to Table No. 7.

Commencing July 1, 1915, the Congress has appropriated for certain expenses which were formerly paid from revenues derived from taxation, etc., on the Canal Zone, which expenses had been paid in the past from these revenues. It was decided to take into the accounts of The Panama Canal certain assets which had been paid from these funds. Table No. 8 shows these assets in detail which are now included in the proper accounts.

Upon the arrival of the Army upon the Isthmus certain buildings constructed from canal appropriations and formerly used by the canal forces were turned over to it. Later, upon the abandonment of the towns on the west side of the canal all buildings and public utilities were used solely by the Army, and in addition certain buildings at Corozal, Gatun, Margarita Island, and Toro Point were likewise occupied by the Army. An appraisal of the present value of these utilities has been made and set up as an asset account separate from that of canal construction under the head of ''Assets transferred to other departments of United States Government,'' detail of which appears in Table No. 9. It is thought that the valuation of these buildings, at least, should be allowed as a credit to the bond issue, for the reason that were it not for the Army's presence on the Isthmus these buildings could have been moved to points on the east bank of the canal, thereby obviating the necessity of further expenditures from appropriations chargeable to bond issue for additional quarters for Panama Canal forces.

Considerable confusion has arisen in the past due to the operation of certain properties belonging to The Panama Canal, by the Panama Railroad, and reversely. In order to obviate this condition, entries have been made charging to account ''Panama Canal property operated by the Panama Railroad'' the appraised value of such property, credit being given to the proper accounts under ''Construction'' and crediting to ''Panama Railroad property operated by Panama Canal,'' charge being made under the proper asset account. A recommendation will be made that Congress be requested to authorize the absolute transfer of title to such property. A detail of this property is shown in Tables 10 and 11.

The present accounting system provides for reserves for depreciation, repairs, and gratuity. The detail of the amounts included in reserves are shown in Table No. 13. Up to the close of the fiscal year, due to difficulties in obtaining information as to the cost of certain items and their present value, it has not been possible to set up these accounts for all the activities of the canal, although some of these reserves have been initiated. The reserve for gratuity represents the estimated accrued amount due employees for vacation time of all classes, and the amount of $715,651.80 closely approximates the actual liability under this head as ascertained from a recent analysis of the account. Some misapprehension exists as to the effect that these reserve accounts will have on cash balances, the impression being that it is necessary to actually retain these amounts in cash. Such is not the case, except for gratuity pay where the amount is an actual liability, as in all other instances appropriations for expenditures which will be chargeable to any of the reserve accounts will have to be made specifically by Congress.

In addition to transiting vessels through the canal, The Panama Canal is engaged, with the authority of Congress, in business operations, and the law provides that net profits on these transactions be ascertained, which profits are to be deposited in the United States Treasury as miscellaneous receipts. In performing work for outsiders, it is essential that there be included in the cost of such work a certain amount to cover the depreciation and repairs to the equipment or tools used in performing the work, as well as a certain amount to cover anticipated gratuity pay to employees engaged in the performance of said work. Similarly, a charge for these items should be made to operation and maintenance of the canal if a true statement of such expenses is to be produced. If no depreciation is charged during the early days of canal operation, the cost thereof will be abnormally low as compared with the cost several years hence when repairs and renewals will be necessary, and as the tolls collected are compared with the operating and maintaining cost, if the latter be low, the canal would show comparatively large profits, which would lead to what would be apparently justifiable requests for lowering the tolls.

Tolls collected during the fiscal year 1915 amounted to $4,343,383.69. The expenses for operation and maintenance were $4,066,727.31, and the loss from business operations (see Table 23) $56,400.78, so that there is an apparent profit in the operation and maintenance of the canal of $220,255.60. However, due to the decision of the Attorney General mentioned in another part of this report, refunds to an amount which can not be accurately estimated at present will be made, which will probably exceed this apparent profit.

CANAL ZONE ACCOUNTS.

Each sundry civil appropriation act from and including the act of March 4, 1907, has contained a provision appropriating the revenues of the Canal Zone, consisting of rentals of public lands and buildings in the Canal Zone and in the cities of Panama and Colon, postal receipts, court fees and fines, and taxes collected under the laws of the Canal Zone, for the maintenance of the public-school system and for public improvements and for other local purposes, postal receipts, however, being appropriated for the maintenance of the postal service. This provision was not included in the act approved March 3, 1915. Instead there was added to the appropriation for civil government an amount substantially equal to the amount estimated as the revenues of the Canal Zone for the fiscal year ending June 30, 1916. The reason for this change in legislation was the reduced amount of revenue derived by the Canal Zone and the necessity for appropriating directly for a part of the expenses previously paid for completely from local revenues. While the law does not specifically so provide, the result thereof will be to cover into the Treasury as miscellaneous receipts the revenues which have heretofore been considered as local revenues of the Canal Zone available for expenditure for local purposes and a corresponding increase in the amount Congress will have to appropriate each year for civil government within the Canal Zone.

The amount of revenues derived from rentals, taxes, court fees and fines, and interest on Canal Zone funds, etc., decreased from $168,076.64 in 1914 to $90,532.69 in 1915. The expenditures during the year amounted to $195,327.06, excluding postal expenditures. The total receipts of the Canal Zone from May 1, 1904, to June 30, 1915, exclusive of postal receipts, amounted to $1,923,680.46, of which $347,643.80 were derived from retail liquor licenses prior to January 1, 1913, $160,630.97 from real estate taxes, $140,883.51

from water taxes, $279,628.07 from inferior court collections, and $228,216.54 from interest on funds deposited in banks. Postal receipts available for partial maintenance of the postal service amounted to $948,072.24. The total cost of the postal service from July 1, 1905, to June 30, 1915, has been $1,807,052.80, of which $873,780.89 have been met from the receipts of that service, the sum of $300,229.17 having been used in purchasing stamps from the Republic of Panama, in accordance with an agreement with the Republic of Panama that payment should be made to it of 40 per cent of all stamp sales. There were expended $926,181.98 for public improvements, consisting of construction and maintenance of roads and trails, market houses, slaughterhouses, and water works and sewers, and $758,125.84 for the public-school system, and $22,700.87 for contingent expenses, out of a total of $80,000 authorized for the purpose. The total money orders issued during the fiscal year was 170,558, as against 198,009 in 1914. The orders amounted to $3,948,752.84 in 1915, as against $4,029,364.97 in 1914. Of these, 150,983, amounting to $2,873,182.84 were issued as money orders proper, fees on which, amounting to $14,188.92, were collected, as against $19,408.44 for the prior fiscal year. The remainder of the orders, 19,575, amounting to $1,075,570, were issued in lieu of postal savings certificates, of which an amount of $1,708,530 was issued the prior fiscal year. Postal savings certificates issued during July, August, and September, 1914, amounted to $804,751, while the payments for the year were $1,178,571. The balance on deposit at the various post offices amounted to $124,661 at the close of business June 30, 1915. The total money-order business, exclusive of the postal savings business to June 30, 1915, has amounted to $39,457,175.33. The total postal savings business to June 30, 1915, has amounted to $5,791,365, making a grand total for money orders and postal savings of $45,248,540.33. A greater part of the orders were drawn on the United States, and on account of such orders the sum of $3,053,407.08 was remitted during the year to the Postmaster General of the United States. On June 30 there was a balance of $8,343.89 due the United States, as against the sum of $471,422.73 due at the end of the prior fiscal year.

With the opening of the canal, the abolishment of the independent revenues of the Canal Zone, and the necessity of purchasing stamps directly from funds appropriated by Congress, the time seems to have come when it is proper to relieve the United States of the payment to the Republic of Panama of 40 per cent of all stamp revenues. I repeat again the recommendation made in previous reports that the postal system of the Canal Zone be relieved of this charge.

The depositaries of Canal Zone funds, including in that term money order, postal savings, and clubhouse funds, have been continued three in number, the District National Bank and the Commercial National Bank, of Washington, D. C., and the Panama Branch of the International Banking Corporation. On June 30, 1913, the amount on deposit was $2,168,339.62; on June 30, 1914, $1,594,285.53, and on June 30, 1915, $770,965.18. There is also a small amount still remaining in the Riggs National Bank of Washington, necessarily left there on account of outstanding checks chargeable against the deposit. These funds are all secured by the deposit of high-grade bonds under the control of a representative of the Government.

Interest on deposits during the year amounted to $48,798.35, as against $61,354.12 received during 1914.

Canal clubhouses received a total revenue of $105,406.48 and expended $110,953.86. The balance June 30, 1915, in clubhouse funds amounted to $21,339.50, against which there was outstanding an amount of $5,278.38, leaving available a balance of $16,061.12, as against an available balance on June 30, 1914, of $15,979.43.

CLAIMS FOR INJURIES AND DEATHS.

There were reported during the fiscal year 2,823 accidental injuries and 47 accidental deaths of Panama Canal employees as having occurred in connection with their work. Compensation was allowed in 1,086 cases of injuries and 23 cases of deaths. For 1,743 injuries no compensation was allowed, as in two cases the injuries were due to the intention of the employee to cause injury of himself or another, in two injuries were due to intoxication of the employee, 100 occurred while the employees were not directly engaged in actual work, and 1,533 resulted in periods of disability not traceable to the accident alleged, or continued for a period of less than seven consecutive days, while approximately 100 are still pending. In the 24 noncompensated death cases, no claims were made in three cases, in seven the employees were not directly engaged in actual work, one death was not due to the injury stated in the report, and 13 cases are still pending. The amount allowed on account of injuries was $41,871.91, and on account of deaths $43,017.71, a total of $84,889.62. In addition, $12,575.87 were paid to employees of the Panama Railroad Company. There was also allowed during the year on account of injuries and deaths occurring prior to April 1, 1914, under the act of May 30, 1908, as amended March 4, 1911, the sum of $17,703.40 for injuries and $14,268.97 on account of deaths, a total of $31,972.37. To June 30, 1915, there have been paid to Panama Canal employees on account of injuries and deaths occurring between August 1, 1908, when the general compensation act was passed, and June 30, 1915, including $35,218.37 allowed under special acts of Congress on account of injuries which were not strictly within the terms of the act or occurred prior to August 1, 1908, $1,265,958.69.

Under the act of May 30, 1908, compensation was payable at the rate of pay received by the employee at time of injury, during the actual time lost on account of the injury, but not exceeding one year from the date thereof. In case of permanent disability the amount paid was one year's pay. In case of death payment of one year's pay was made to the widow, children, and dependent parents. Under the Executive order at present in force injuries which result in disability for a short period do not receive as much compensation as under the act of May 30, 1908. For the first three months of disability an employee receives 75 per cent of his monthly pay, except that pay in excess of $200 is not taken into consideration. After three months 50 per cent of the monthly pay is the basis of compensation. In cases of serious injury or death the present order is of greater benefit, as the employee or his dependents receive a much larger compensation than under the original law.

The two cases following illustrate the benefits derived by employees under the order at present in effect: A boiler maker receiving 38 cents per hour sustained an injury which prevented him from further following his trade, and under the Executive order payment was made to him in the sum of $1,828.53. Had payment been made under the act of May 30, 1908, the amount of compensation payable would have been $943.44. In the case of an injury resulting in the death of an employee receiving 56 cents per hour, the widow and dependent parent of such employee, under the old rule, would have received one year's pay, $1,393.28, apportioned between them. Under the Executive order the payment would be $2,394.91 to the widow and $1,036.94 to the parent, a total of $3,431.85, thus making the payment under the Executive order nearly two and one-half times as much as under the act of May 30, 1908. Employees whose disability continues for less than seven consecutive days receive no compensation. Employees sustaining injuries which, while permanent in character do not prevent them from returning to their work, receive injury compensation while unable to work.

GENERAL.

For hotel and commissary coupon books issued to employees the sum of $136,298.43 was collected for hotel books by pay roll deduction and $2,853,180.28 for commissary books, while the sum of $192,859.04 was collected for meal tickets issued to silver employees. Hotel books to the value of $105,544.80 and commissary books to the value of $1,339,495 were sold for cash. Hotel coupons to the value of $261,543.80 and commissary coupons to the value of $250,973.92 were honored at the hotels, the use of commissary books having been substituted for hotel books in November, 1914. Commissary coupons to the value of $3,948,102.59 were honored at the commissaries. With a few minor exceptions, all work connected with the counting of this mass of coupons was gradually transferred from the commissaries to this office after the consolidation, in order to better protect the handling of these money values. Where sales slips are used the coupons come in attached thereto and are readily checked against such slips. In the case of coupons received in bulk from each salesman it is necessary to make a double count after the coupons have been sorted out by denominations. The transfer of the work resulted in a considerable decrease in expense and undoubtedly provided additional safeguards against the misuse of coupons.

The periodical examination of the accounts of the 200 officers and employees having the collection, custody, and disbursement of money and the issue and custody of coupon books and other items having a money value was regularly continued throughout the year, the number of accounts having been increased with the addition of the station and other financial agents of the railroad company.

The schedule bond under which about 260 employees of the canal are bonded for the faithful performance of their duties was renewed for the fiscal year ending June 30, 1916, with the Maryland Casualty Co. at the same rates provided for the preceding year, namely, 65 cents for postal clerks, $1.25 for postmasters, and $1.70 for other employees.

The inspection of time books and the methods of timekeeping were continued for the purpose of preventing the padding of time books and insuring that the keeping of time in the field is done in conformity with the regulations. As heretofore, numerous minor errors were discovered by this force, as well as some cases of fraudulent practices. The actual amount known to have been saved by this force is much less than the expense thereof, but the moral effect in preventing fraudulent practices through continuing this work can not be overestimated. The expense incurred provides a very good insurance against mistakes and fraud.

The final statement of receipts, issues, and transfers of stores, Table 48, shows that there were purchased and taken up in the account of stores of the supply department material and supplies of a value of $6,297,280.39, while material and supplies of a value of $8,659,744.53 were purchased and shipped directly to divisions and accountable officials. There were issued on foremen's orders material and supplies to the value of $7,862,076.43, while the sales amounted to $406,540.22. The value of the regular stock in quartermaster's stores, including $99,862.74 for fuel oil, July 1, 1915, as determined from the inventories, was $3,284,244.35. The value of material in the hands of divisions and not yet charged to the work was $433,120.51. There was in the obsolete store material to the value of $611,838.35. This last item is exclusive of the value of large units of construction equipment which are available for sale, for the reason that the total cost of such items is charged to construction, to which credit will be given when the equipment is sold to the amount of the net proceeds derived from such sales.

The commissary accounts show that supplies to the value of $5,089,080 were purchased during the year, as against $5,489,463.37, purchased during the preceding year. Groceries were purchased to the value of $1,538,431.75, and cold storage to the value of $1,832,382.79, the latter showing a reduction from $2,165,898.60 purchased last year. Supplies costing $4,983,985.98 delivered on the Isthmus were sold for $6,249,698.58. The net profits for the year were $71,234.34. Sales to The Panama Canal amounted to $1,303,755.30; to other branches of the United States Government, $651,869.52, as against $232,857.88 for the preceding year; to steamship companies, $150,228.70, as against $10,779.98; for coupons issued to employees and others entitled to purchase from the commissaries, $3,948,102.59. On the total value of supplies sold the average surcharge added to the cost delivered on the Isthmus was 21.68 per cent. Supplies to the value of $4,326,714.67 were purchased in the United States, $575,225.07 from foreign countries, and $141,951.66 on the Isthmus. (See Tables 49 and 50.)

On January 1, 1915, cost accounts were established for the Ancon Hospital in order to produce average costs for the various activities. Detailed cost sheets are published in Table No. 53. It will be seen that for the six months to June 30, 1915, meals were furnished at the gold mess at an average cost of $0.9858 per day and at the silver mess at an average cost of $0.1847 per day. The average cost of surgical operations was $8.4444, and of operations in eye and ear ward $7.8496 per operation. The cost per patient, per day, in white surgical ward was $1.6395; in the black surgical ward, $0.7242; in the white medical ward, private rooms, $4.1103; in the white eye and ear ward, $1.7671; in the black eye and ear ward, $1.4653; in the white female ward, $3.3520; in the black female ward, $1.3467; in the white female ward, private rooms, $4.4932; in the white male medical ward, $1.6547; in the black male medical ward, $1.0070. In the ward for chronic patients the average cost per day was $0.2980, and in the isolation ward $1.6474. In the insane asylum the average cost was $0.6983.

In the Colon Hospital cost accounts were established commencing with the month of March, and to June 30 the average cost for white patients per patient per day has been $2.3240, and for black patients $1.7552.

At the leper asylum the average cost per patient per day from January has been $1.2875. This cost covers all expenses of the hospital, including superintendence, etc.

During the fiscal year there were excavated for construction of the Atlantic entrance of the canal, 12,514 cubic yards at an average division cost of $0.3169 per cubic yard; in Gaillard Cut, 1,960,617 cubic yards at an average cost of $0.4226 per cubic yard; in Miraflores Lake, 40,830 cubic yards at an average cost of $0.2593 per cubic yard; at the Pacific entrance, 498,400 cubic yards at an average division cost of $0.4820 per cubic yard. For further detail, reference is made to Table No. 54.

In addition to the dredging, which was charged to construction, there were excavated the following quantities in maintaining the channel: At the Atlantic entrance, 1,233,301 cubic yards at an average direct cost of $0.1017 per cubic yard; in Gaillard Cut, 4,710, 566 cubic yards at an average direct cost of $0.3467 per cubic yard; in Miraflores Lake, 8,662 cubic yards at an average direct cost of $0.2601; and at the Pacific entrance, 43,612 cubic yards at an average direct cost of $0.1979 per cubic yard. For further detail, reference is made to Table No. 55.

During the fiscal year just ended, there were produced from the gravel beds in the Chagres River, 377,871 cubic yards of sand and gravel at an average cost delivered in storage pile, of $0.7104 per cubic yard. Further details are shown in Table No. 56.

From January 1, 1915, to the close of the fiscal year there were distributed from the power-producing plants 13,965,587 kilowatt hours of electricity at an average cost for production of $0.0067 per k. w. h. The cost of this current distributed was $0.0099 per k. w. h. Further details are shown in Table No. 57.

Beginning with the month of April methods were established to arrive at the cost of water furnished through the Ancon-Balboa system. To the end of the fiscal year 336,567,000 gallons had been furnished within the Zone at an average cost of $0.0647 per thousand gallons. During the fiscal year just ended 327,211,000 gallons of water were furnished by the Gatun system at an average cost of $0.1129 per thousand gallons. By the Colon-Cristobal system there were furnished within the Zone 699,826,000 gallons of water at an average cost of $0.0713 per thousand gallons. For further details, reference is made to Tables Nos. 58, 59, and 60.

By Executive order dated January 15, 1915, rent was charged employees, effective March 1, 1915. By the terms of the Executive order rental that was to be sufficient to cover the cost of maintenance of quarters and grounds, maintenance and renewal of furniture, collection and disposal of garbage, and for janitor service in bachelor quarters, was to be charged employees; and in order to ascertain if the rents collected equalled the expenses cost accounts were established for the various classes of quarters, details of which appear in Table No. 61. This order was suspended on May 24, 1915, until June 30, 1916, but the cost accounts will be continued, as they will be of value in determining the rental rates in the future.

During the fiscal year just ended, the expenses on account of civil government were $462,144.17; of the health department, $923,234.25; and of administration, $3,003,885.99. Of these amounts there were charged directly to other interests $38,367.01, $351,009.56, and $382,233.51, respectively, leaving balances of $423,777.16, $572,224.69, and $2,621,652.48, respectively, a grand total of $3,617,654.33, which was distributed as overheads to the following accounts: Operation and maintenance of canal, $1,374,692.10; construction of canal, $1,644,721.67; fortifications, $329,905.54; sales and services to outsiders including other branches of the United States Government, $267,463.86; and to public works in the cities of Panama and Colon, $871.16.

The proper distribution of general expenses not allocable to one interest has been a perplexing problem. Until August 15, 1914, all overheads were charged to construction work, except a small proportion chargeable to maintenance and to work done for outside parties, and it was a comparatively simple matter to determine a reasonable basis for distribution. From that date a period followed when construction was the main work carried on, with the operation and maintenance of the canal growing in importance daily, and every effort was made to make charges direct against the interest receiving the benefit of the general expenses incurred. The determination of the amount of indirect expenses to be charged to operation and maintenance was based as closely as possible upon the relative importance of the work and the amount of expense for operation and maintenance that would necessarily continue after construction work was completed. The results of the distribution determined upon are shown in Table 62.

For the coming year the proportion of the general expense items chargeable to operation and maintenance can be more readily determined, as the experience of the past year will furnish a guide. The main activity of the canal organization is now the operation and maintenance of the canal, and following the rules of the Interstate Commerce Commission for distributing expenses to outside operations of railroads it is not deemed proper to make charges against outside operations other than for the additional expenses caused by conducting such outside operations. The general expenses can not be distributed on the ratio of direct expenses charged to each interest. The direct expenses for operation and maintenance will possibly amount to from $200,000 to $250,000 per month, while it is possible that the direct expenses for outside operation may equal or even exceed that amount. To divide the general expenses on a basis of the total direct expenditures would result in excessive and prohibitive charges against the business operations, which are subsidiary to the main purpose of the canal. An analysis of the items included in civil government, sanitation and administration, including such items as cover the cost of securing, transporting, paying, quartering, and providing proper surroundings for employees, and the purchasing, inspecting, transporting, storing, issuing, and accounting for material and supplies will show the amount that may be considered as properly chargeable against the operation and maintenance of the canal and leave a balance from which it is believed that a flat percentage can be fixed as the basis for making charges against outside interests for general and unlocated expenses.

The final figures in regard to Panama Railroad accounts are not available at this time. The railroad traffic and revenues show a large reduction due to cutting off of through traffic since the canal was opened for operation; also in some degree to the reduction of canal forces and the centralization of work on the Isthmus at the two termini of the canal. Two hundred and sixteen thousand and ninety-one tons of through freight were carried, as against 643,178 tons for the preceding year. Eight hundred and seventy-seven thousand six hundred and fifty-one tons of local freight were carried, as compared with 990,551 tons during the preceding year. The revenues derived from through freight decreased from $1,968,560.02 to about $600,000, and for local freight from $912,966.70 to about $675,000. Through passengers numbered 4,704, and a total revenue of about $12,300 was derived, as compared with 10,778 passengers for the preceding year with a revenue of $26,428.96. Local passengers numbered 1,833,579 with a revenue of about $718,000 as against 3,114,196 passengers for the preceding year with a revenue of $1,089,853. The land rent collected amounted to $112,550.23 as against $141,792.99 for the preceding year. The total operating and miscellaneous revenues of the railroad for the year will exceed by a small amount the operating expenses. Complete figures will be published with the report of the railroad.

It has been an exceedingly trying year, and I can not close this report without commending the work of the employees of this department and the zeal with which difficult situations have been met. Reorganizations throughout by departments and divisions, the consolidation of work of a somewhat different character, the beginning of new enterprises and the necessity of carrying on business operations in conformity with business methods and at the same time in conformity with the essential laws and regulations governing accounting for funds and property of the United States have furnished for solution many involved problems. The difficulties connected with the changes have been felt strongly by the accounting department.

Respectfully submitted.

H. A. A. Smith,
Auditor, The Panama Canal.

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

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THE PANAMA CANAL.

TABLE No. 1.—*Status of authorized bond issue.*

Authorized bond issue					$375,200,900.00
Appropriations by Congress				$394,399,149.02	
Less appropriations for—					
Fortifications			$14,689,873.30		
Presentation launch *Louise*			6,000.00		
Annual payment to Republic of Panama			750,000.00		
Maintenance, operation, sanitation, and civil government of canal			6,440,000.00		
				21,885,873.30	
Appropriated for canal construction				372,513,275.72	
Paid from appropriation for construction but exempted by law as a charge against authorized bond issue—					
Two colliers			2,000,000.00		
Expended for operation and maintenance of canal to June 30, 1915			4,289,159.00		
Stock of material and supplies for operation and maintenance of canal			2,225,000.00		
				8,514,159.09	
Net amount chargeable to authorized bond issue					363,999,116.72
Balance available for appropriation within limit of cost of canal and authorized bond issue					11,201,783.28
Net amount of appropriation chargeable to authorized bond issue				$363,999,116.72	
Amount appropriated for colliers				2,000,000.00	
				365,999,116.72	
Construction of canal to June 30, 1915			$328,359,038.81		
Less reserves for depreciation		$147,704.42			
Less assets received from Canal Zone Government		539,902.50			
Less Panama Railroad property operated by Panama Canal		749,744.73			
			1,437,351.65		
					326,921,687.16
Equipment and tools			6,269,759.17		
Less reserves for depreciation		346,342.45			
Less Panama Railroad property operated by Panama Canal		89,418.97			
			435,761.42		
					5,833,997.75
Material and supplies			4,374,860.10		
Less estimated for—					
Operation and maintenance		2,225,000.00			
Received from Canal Zone Government		2,167.04			
			2,227,167.04		
					2,147,693.06
Public works in the cities of Panama and Colon					2,417,936.73
Reequipment loans to Panama Railroad Co					1,399,114.61
First mortgage bond loan to Panama Railroad Co					1,848,217.50
Panama Canal property operated by Panama Railroad					1,687,650.23
Assets transferred to other departments United States Government					1,160,304.56
Amount returned to Treasury as miscellaneous:					
Receipts (other than tolls)			$6,563,067.88		
Less amounts not credited to assets			1,965,502.32		
					4,597,565.56
Work in progress			3,450,586.76		
Less chargeable to operation and maintenance appropriations—					
1 Bucyrus dredge		$190,903.97			
3 dump barges		122,187.00			
			313,090.97		
					3,137,495.79
Accounts receivable outstanding					1,468,101.70
Payments on account of capital cost public works in Panama and Colon, repaid to appropriations				396,956.06	
Available cash in hands United States Treasurer and fiscal officers and transfers outstanding:					
Construction and equipment appropriation, 1916		$10,500,000.00			
Balance in Panama Canal fund		4,855,025.96			
Balance in Canal connecting Atlantic and Pacific Oceans	$804,992.99				
Less transfer outstanding	1,303.34				
		803,689.65			
Transfer to credit Panama Canal fund outstanding		589,099.91			
Private acts		1,500.00			
1 dredge and 2 barges to be paid from operation and maintenance		313,090.97			
			$17,062,406.49		

Available cash in hands United States Treasurer and fiscal officers and transfers outstanding—Continued.				
Less—				
Accounts payable....	$2,511,677.16			
Reserves for gratuity.	715,651.80			
Reserves for repairs..	206,214.16			
		$3,433,543.12		
Less—				
Payable from trust funds cash	57,514.48			
Fortifications appropriations....	89,930.28			
		147,444.76		
			$3,286,098.36	
				$13,776,308.13
			$366,396,072.78	366,396,072.78

Table No. 2.—*General balance sheet, June 30, 1915.*

ASSETS.

Construction of canal (Table No. 3).		$328,359,038.81
Equipment and tools (Table No. 4).		6,269,759.17
Material, supplies, and equipment in storehouses (Table No. 6).....		4,374,860.10
Fortifications......................		11,207,766.30
Public works in the cities of Panama and Colon..................		2,417,936.73
Reequipment loans to Panama R. R. Co.......................		1,399,114.61
First mortgage bond loan to Panama R. R. Co..................		1,848,217.50
Maintenance and operation of canal (Table No. 7).....................		4,289,159.00
Annual payment to Panama Republic for Zone rights...........		750,000.00
Assets transferred to other departments, United States Government (Table No. 9)..............		1,160,304.56
Panama Canal property operated by Panama R. R. (Table No. 10).		1,687,650.23
Credit to miscellaneous receipts, United States funds other than tolls..........	$6,563,067.88	
Less amounts not credited to assets (Table No. 14).....	1,965,502.32	
		4,597,565.56
Work in progress (Table No. 5)....		3,450,586.76
Accounts receivable...............		1,468,101.70
Appropriation balances subject to requisitions (Table No. 12)......		21,711,269.74
Cash in hands of fiscal officers.......		5,715,224.93
Total.........................		400,706,555.70

LIABILITIES.

Appropriations by Congress (Table No. 12).........................		$394,399,149.02
Trust funds.........................		41,326.44
Security deposits..................		240,572.99
Reserves (Table No. 13)...........		1,415,912.83
Assets received from Canal Zone Government (Table No. 8).......		542,069.54
Panama R. R. property operated by Panama Canal (Table No. 11).		839,163.70
Reimbursements account public works in Panama and Colon repaid to appropriations..........		396,956.06
Accounts payable..................		2,511,677.16
Miscellaneous receipts, United States funds (Table No. 14)....	$10,921,070.25	
Less deposited in United States Treasury..........	10,601,342.29	
		319,727.96
Total.........................		400,706,555.70

Table No. 3.—*Construction of canal to June 30, 1915.*

[Quantities are expressed in cubic yards except when otherwise specified.]

FROM AND INCLUDING GATUN TO THE SEA.

	Quantities.	Amount.	Unit cost.
Prism excavation:			
Dry excavation..............	2,181,998	$1,260,011.20	$0.5775
Hydraulic excavation..............	29,605	10,318.87	.3485
Dredging excavation..............	39,044,914	7,718,313.72	.1977
Total direct cost..............	....	8,988,643.79	....
Administrative and general expenses..............	....	953,278.73	....
Civil government, health, and general items..............	....	1,987,860.40	....
Total prism excavation..............	....	11,929,782.92	....
Gatun spillway:			
Dry excavation..............	1,544,202	948,915.04	.6145
Preparing foundations..............	44,715	87,896.99	1.9657
Masonry—			
Plain..............	228,723	1,696,598.87	7.4177
Reinforced..............	2,456	37,470.35	15.2567
Total masonry..............	231,179	1,734,069.22	7.5010

TABLE NO. 3.—*Construction of canal to June 30, 1915*—Continued.

[Quantities are expressed in cubic yards except when otherwise specified.]

FROM AND INCLUDING GATUN TO THE SEA—Continued.

	Quantities.	Amount.	Unit cost.
Gatun spillway—Continued.			
Iron work		$145,868.58	
Gates		90,687.83	
Operating machinery		103,150.65	
Back-filling	50,183	24,935.19	$0.4969
Total direct cost		3,135,523.50	
Administrative and general expenses		313,324.89	
Civil government, health, and general items		652,822.72	
Total Gatun spillway		4,101,671.11	
Gatun dam:			
Dredging excavation	38,425	18,322.71	.4769
Dry filling	12,229,104	4,703,962.12	.3847
Hydraulic filling	10,728,965	2,645,947.37	.2466
Paving and surfacing—			
Excavation	15,078	31,704.98	2.1027
Placing riprap	78,590	65,299.15	.8309
Placing broken stone	15,740	38,620.09	2.4536
Surfacing (square yards)	390,065	21,882.79	.0561
Total paving and surfacing		157,507.01	
Permanent tracks		12,261.60	
Total direct cost		7,538,000.81	
Administrative and general expenses		756,812.64	
Civil government, health, and general items		1,572,492.82	
Total Gatun dam		9,867,306.27	
East saddle dam, Gatun:			
Dry filling (direct cost)	4,117	1,687.85	.4100
Administrative and general expenses		113.96	
Civil government, health, and general items		340.49	
Total		2,142.30	
Trinidad River dam:			
Dry filling (direct cost)	72,105	54,818.81	.7603
Administrative and general expenses		4,137.40	
Civil government, health, and general items		7,757.06	
Total		66,713.27	
Gatun-Mindi levee:			
Dry filling	290,189	100,497.72	.3463
Hydraulic filling	20,398	3,326.91	.1631
Total direct cost		103,824.63	
Administrative and general expenses		15,012.48	
Civil government, health, and general items		22,462.34	
Total		141,329.45	
Gatun locks:			
Dry excavation	4,660,055	2,814,729.46	.6040
Dredging excavation	1,756,977	495,650.69	.2821
Preparing foundations—			
Dry excavation	228,376	404,761.97	1.7724
Dredging	19,814	36,581.03	1.8462
Filling for approach walls	41,661	16,008.63	.3843
Concrete pile foundations, approach walls (lin. ft.)	83,670	138,689.56	1.6576
Wooden pile foundations, approach walls (lin. ft.)	251,999	143,537.40	.5696
Total preparing foundations		739,578.59	
Masonry—			
Concrete—plain	1,945,487	13,260,258.29	6.8159
Concrete—reinforced	95,753	1,100,401.66	11.4920
Total masonry	2,041,240	14,360,659.95	7.0353
Iron work		1,241,241.06	
Gates and fender chains		2,840,736.70	
Emergency dams		928,531.01	
Operating machinery		3,054,611.77	
Concrete used in machinery installation	26,734	342,752.77	12.8209

TABLE NO. 3.—*Construction of canal to June 30, 1915*—Continued.

[Quantities are expressed in cubic yards except when otherwise specified.]

FROM AND INCLUDING GATUN TO THE SEA—Continued.

	Quantities.	Amount.	Unit cost.
Gatun locks—Continued.			
Control house—			
Masonry	662	$23,067.31	$34.8448
Iron work and miscellaneous		33,927.39	
Machinery installation		40,413.09	
Total control house		97,407.79	
Lock office building		14,175.66	
Buffer timbers		16,382.91	
Crib fenders		40,452.81	
Back-fill	2,119,406	1,093,691.87	.5160
Filling center wall	113,163	87,048.28	.7692
Filling around south approach wall—			
Dry filling	7,072	3,600.90	.5092
Hydraulic filling	594,495	91,847.98	.1545
Total filling around south approach wall		95,448.88	
Cleaning up		31,606.06	
Total direct cost		28,294,706.26	
Administrative and general expenses		1,654,449.46	
Civil government, health and general items		5,691,391.78	
Total Gatun locks		35,640,547.50	
Colon breakwaters:			
West breakwater—Filling and trestle	1,276,479	3,344,447.02	2.6201
East breakwater—Filling and trestle (Table No. 15)		1,561,674.39	
Total direct cost		4,906,121.41	
Administrative and general expenses		541,484.27	
Civil government, health and general items		845,824.93	
Total Colon breakwaters		6,293,430.61	
Total, from and including Gatun to the sea		68,042,923.43	

FROM GATUN TO PEDRO MIGUEL

	Quantities.	Amount.	Unit cost.
Prism excavation and clearing:			
Dry excavation	110,261,883	$78,585,693.57	$0.7127
Dredging excavation	5,954,149	2,706,734.43	.4550
Hydraulic excavation	1,633,647	342,702.79	.2098
Clearing without excavation (acres)	2,530	155,226.38	61.3543
Total direct cost		81,790,417.17	
Administrative and general expenses		8,294,921.84	
Civil government, health and general items		16,792,911.22	
Total prism excavation and clearing		106,878,250.23	

FROM AND INCLUDING PEDRO MIGUEL TO THE SEA.

	Quantities.	Amount.	Unit cost.
Prism excavation:			
Dry excavation	4,819,969	$3,108,345.96	$0.6449
Hydraulic excavation	1,549,904	1,075,117.67	.6937
Dredging excavation	40,661,517	9,368,337.64	.2304
Total direct cost		13,551,801.27	
Administrative and general expenses		1,202,873.91	
Civil government, health and general items		2,859,054.93	
Total prism excavation		17,613,730.11	
Pedro Miguel dams:			
Dry excavation	10,475	19,039.71	1.8177
Dry filling	699,518	314,734.74	.4499
Masonry	1,567	7,842.17	5.0046
Total direct cost		341,616.62	
Administrative and general expenses		23,264.93	
Civil government, health and general items		68,953.83	
Total Pedro Miguel dams		433,835.38	

TABLE NO. 3.—*Construction of canal to June 30, 1915*—Continued.

[Quantities are expressed in cubic yards except when otherwise specified.]

FROM AND INCLUDING PEDRO MIGUEL TO THE SEA—Continued.

	Quantities.	Amount.	Unit cost.
Pedro Miguel locks:			
Dry excavation	1,133,280	$904,867.58	$0.7985
Preparing foundations	175,987	430.205.59	2.4446
Masonry—			
Concrete, plain	839,398	4,381,825.62	5.2202
Concrete, reinforced	67,777	599,264.21	8.8417
Total masonry	907,175	4,981,089.83	5.4908
Iron work		622,046.85	
Gates		1,689,616.13	
Emergency dams		937,958.48	
Operating machinery		1,843,492.45	
Concrete used in machinery installation	21,433	257.951.10	12.0352
Control house—			
Masonry	797	45,298.92	56.8368
Ironwork and miscellaneous		25,674.54	
Machinery installation		27,915.21	
Total control house		98,888.67	
Lock office building		17,938.88	
Buffer timbers		15,616.07	
Crib fenders		18,579.66	
Back fill	834,288	363,919.41	.4362
Filling center wall	220,768	105,459.15	.4777
Cleaning up		21,449.49	
Total direct cost		12,309,079.34	
Administrative and general expenses		783,635.97	
Civil government, health and general items		2,477,865.14	
Total Pedro Miguel locks		15,570,580.45	
Miraflores east dam and spillway:			
Dry excavation in site	242,399	303,037.56	1.2502
Dry excavation, discharge channel	26,338	18,368.28	.6974
Masonry—			
Concrete, plain	73,277	443,085.14	6.0467
Concrete, reinforced	977	14,923.61	15.2749
Total masonry	74,254	458,008.75	6.1681
Ironwork		29,094.45	
Gates and caisson		48,296.22	
Operating machinery		104,531.11	
Concrete used in machinery installation	59	3,110.85	52.7263
Extension of spillway wall		17,602.61	
Dike and trestle bridge		42,195.29	
Cleaning up		1,888.93	
Total direct cost		1,026,134.05	
Administrative and general expenses		91,052.86	
Civil government, health, and general items		209,001.87	
Total Miraflores east dam and spillway		1,326,188.78	
Miraflores west dam:			
Dry excavation	24,459	25,549.07	1.0446
Masonry	4,525	20,214.95	4.4674
Dry filling	1,758,423	802,505.11	.4564
Hydraulic filling		53,490.49	
Total direct cost		901,759.62	
Administrative and general expenses		77,994.40	
Civil government, health, and general items		185,762.72	
Total Miraflores west dam		1,165,516.74	
Miraflores locks:			
Dry excavation, diversion	5,885	2,028.98	.3448
Dry excavation, lock site	2,222,582	1,809,065.14	.8139
Dredging excavation, lock site	309,647	129,192.56	.4172
Hydraulic excavation, lock site	332.703	182,526.79	.5486
Preparing foundations—			
Dry excavation	415,981	714,728.22	1.7182
Wooden pile foundations (linear feet)	44,705	54,628.66	1.2220
Total preparing foundations		769,356.88	

TABLE No. 3.—*Construction of canal to June 30, 1915*—Continued.

[Quantities are expressed in cubic yards except when otherwise specified.]

FROM AND INCLUDING PEDRO MIGUEL TO THE SEA—Continued.

	Quantities.	Amount.	Unit cost.
Miraflores locks—Continued.			
Masonry—			
Concrete, plain	1,408,484	$6,628,102.30	$4.7058
Concrete, reinforced	71,255	769,306.80	10.7965
Total masonry	1,479,739	7,397,409.10	4.9991
Iron work		871,408.07	
Gates		1,927,105.25	
Emergency dams		833,842.33	
Operating machinery		2,457,171.22	
Concrete used in machinery installation	28,781	339,509.32	11.7963
Control house—			
Masonry	949	54,360.38	57.2817
Ironwork and miscellaneous		24,519.41	
Machinery installation		40,751.20	
Total control house		119,630.99	
Lock office building		20,222.45	
Buffer timbers		6,507.93	
Crib fenders		53,081.06	
Back-fill	2,366,252	924,559.29	.3907
Filling center wall	249,457	145,826.14	.5846
Cleaning up		42,953.51	
Permanent tracks		5,204.52	
Total direct cost		18,036,601.53	
Administrative and general expenses		1,279,142.93	
Civil government, health, and general items		3,606,957.56	
Total Miraflores locks		22,922,702.02	
La Boca locks and dams (abandoned):			
Dry excavation	78,233	131,254.40	1.6777
Construction of dam		288,601.56	
Construction of locks		145,828.37	
Total direct cost		565,684.33	
Administrative and general expenses		66,584.11	
Civil government, health, and general items		119,479.88	
Total La Boca locks and dams		751,748.32	
Naos Island breakwater:			
Filling and trestle (direct cost)	2,087,745	790,718.55	.3787
Administrative and general expenses		69,195.76	
Civil government, health, and general items		161,040.63	
Total Naos Island breakwater		1,020,954.94	
Total Pedro Miguel to the sea		60,805,256.74	
Aids to navigation (Table No. 16):			
Lights and buoys (direct cost)		409,586.15	
Administrative and general expenses		53,965.78	
Civil government, health, and general items		113,771.73	
Total aids to navigation		577,323.66	
Total canal		236,303,754.06	

MISCELLANEOUS.

Power producing and transmitting system:			
Gatun hydroelectric power plant—			
Excavation		$54,862.07	
Building		285,016.85	
Operating machinery		315,318.39	
Total Gatun hydroelectric power plant		655,197.31	
Miraflores steam-electric power plant—			
Building and site		199,312.00	
Machinery		3,792.19	
Total Miraflores steam-electric power plant		203,104.19	

TABLE No. 3.—*Construction of canal to June 30, 1915*—Continued.

[Quantities are expressed in cubic yards except when otherwise specified.]

MISCELLANEOUS—Continued.

	Quantities.	Amount.	Unit cost.
Power producing and transmitting system—Continued.			
Transformer substations (Table No. 17)—			
Cristobal		$289,200.93	
Gatun		314,165.48	
Gamboa		23,775.03	
Miraflores		336,516.44	
Balboa		281,198.25	
Total transformer substations		1,244,856.13	
Transmission and duct lines (Table No. 17)—			
Transmission line		1,082,471.58	
Duct lines		319,046.81	
Distribution lines		15,601.52	
Total transmission lines		1,417,119.91	
Total direct cost		3,520,277.54	
Administrative and general expenses		310,664.22	
Civil government, health, and general items		560,097.20	
Total power producing and transmitting system		4,391,038.96	
Atlantic terminals:			
Cristobal coaling station (Table No. 18)		2,049,232.50	
Cristobal fuel oil plant (Table No. 18)		140,190.64	
Cristobal dry dock		65,000.00	
Cristobal shops		84,843.25	
Cristobal roundhouse		43,205.85	
Gatun dock		7,528.64	
Total direct cost		2,390,000.88	
Administrative and general expenses		193,388.76	
Civil government, health and general items		145,682.58	
Total Atlantic terminals		2,729,072.22	
Balboa terminals (Table No. 19):			
Preparatory work		1,155,072.11	
Dredging inner harbor		1,176,582.70	
Main dry dock		1,796,690.06	
Coaling station		833,036.83	
Entrance basin		376,086.35	
Shops		2,788,221.14	
Shop office building		165,135.17	
Storehouses		511,566.08	
Docks [1]		1,994,781.34	
Fuel oil plant		241,636.83	
Total direct cost		11,038,808.61	
Administrative and general expenses		975,557.31	
Civil government, health and general items		1,509,847.80	
Total Balboa terminals		13.524,213.72	
Permanent townsites (Table No. 20):			
Balboa-Ancon		927,678.68	
La Boca		151,986.63	
Pedro Miguel		116,672.82	
Gatun		13.694.07	
Cristobal		53,062.30	
Total direct cost		1,263.094.50	
Administrative and general expenses		126,113.41	
Civil government, health and general items		153.907.98	
Total permanent townsites		1,543,115.89	
Buildings (Table No. 21):			
Designing and preliminary expenses		18,778.45	
Administration building, Balboa		923.294.49	
Administration building, Santa Rosa		100,000.00	
Paraiso shops		2,800.00	
Storehouses		122,788.95	

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[1] Includes $389,314.69, cost of concrete dock originally built for Panama Railroad, but now operated by Panama Canal. This amount is credited to "Panama Railroad property operated by Panama Canal" on general balance sheet.

Table No. 3.—*Construction of canal to June 30, 1915*—Continued.

[Quantities are expressed in cubic yards except when otherwise specified.]

MISCELLANEOUS—Continued.

	Quantities.	Amount.	Unit cost.
Buildings (Table No. 21)—Continued.			
Hotels and mess halls		$257,137.91	
Gold quarters		2,720,313.96	
Silver quarters		341,992.68	
Colon Hospital		10,963.78	
Dispensaries		16.554.28	
Asylums		106,078.76	
Quarantine stations		48,921.24	
Medical storehouses		22,259.62	
Post offices		35,982.62	
Schoolhouses		69,515.00	
Courthouses, fire and police stations, jails, etc		90,316.12	
Fluviographs		11,479.38	
Miscellaneous buildings		190,668.13	
Total direct cost		5,089,845.37	
Administrative and general expenses		290,782.27	
Civil government, health and general items		311,335.33	
Total buildings [1]		5,691,962.97	
Sanitary fills:			
Ancon-Balboa		129,758.15	
Balboa Y		110,829.29	
Miraflores power house		16,599.52	
Pedro Miguel townsite		57,610.74	
Mount Hope		919.89	
Total direct cost		315,717.59	
Administrative and general expenses		462.45	
Civil government, health and general items		58,645.60	
Total sanitary fills		374,825.64	
Waterworks systems:			
Colon-Cristobal—			
Total direct cost		583,644.54	
Administrative and general expenses		501.88	
Civil government, health and general items		182.63	
Total Colon-Cristobal system		584,329.05	
Panama-Gamboa (Table No. 22):			
Total direct cost		1,586,514.75	
Administrative and general expenses		149,070.54	
Civil government, health and general items		21,354.17	
Total Panama-Gamboa system		1,756,939.46	
Other Zone systems—			
Gatun		241,000.00	
Others		297,606.13	
Total direct cost		538,606.13	
Administrative and general expenses		3,997.65	
Civil government, health and general items		1,322.81	
Total other Zone systems		543,926.59	
Total waterworks systems		2,885.195.10	
Zone sewage system:			
Total direct cost		67,194.26	
Administrative and general expenses		215.91	
Civil government, health, and general items		59.95	
Total Zone sewage system		67,470.12	
Zone roadways:			
Total direct cost		543,357.54	
Administrative and general expenses		2,731.02	
Civil government, health, and general items		663.42	
Total Zone roadways		546,751.98	

[1] Does not include the following buildings shown under "Balboa Terminals:" Shops, shop office building, storehouses, in amount $4,319,824.77; they having been estimated under that head.

TABLE NO. 3.—*Construction of canal to June 30, 1915*—Continued.

[Quantities are expressed in cubic yards except when otherwise specified.]

MISCELLANEOUS—Continued.

		Quantities.	Amount.	Unit cost.
Real estate:				
For canal construction and flooded areas			$854,456.45	
For auxiliary works and buildings			146,108.94	
For depopulation of the Canal Zone			569,269.44	
Total real estate			1,569,834.83	
Miscellaneous:				
Gravel reclaiming plant, Gamboa			50,702.63	
Relocation Panama Railroad			9,774,671.96	
Investment Panama Railroad stock			155,818.24	
Concession from Republic of Panama			10,000,000.00	
Purchases from New Panama Canal Co			38,750,610.49	
Original payment	$40,000,000.00			
Expenses caring for equipment, etc	2,833.23			
	40,002,833.23			
Material sold or used in construction	1,252,222.74			
Total miscellaneous			58,731,803.32	
Total construction of canal			328,359,038.81	

TABLE NO. 4.—*Detail of "Equipment and tools."*

	Amount.		Amount.
Steamship Cristobal	$716,085.43	Pacific locks equipment and tools	$376,583.83
Steamship Ancon	728,271.88	Electrical division equipment and tools	139,430.67
Locks unwatering barge	27,676.85	Health department equipment and tools	158,631.36
Locks caisson	344,787.19	Administration building furniture	6,615.40
Locks diving barge	403.01	Corral equipment	2,965.12
Dredging equipment and tools	3,052,076.73	Balboa storehouse equipment	18,859.63
Mechanical division equipment and tools	110,528.46		
Marine division equipment and tools	327,876.48		
Gatun locks equipment and tools	258,967.13	Total	6,269,759.17

TABLE NO. 5.—*Detail of "Work in progress."*

	Amount.
2 colliers, W. No. 50236	$1,902,046.25
2 floating cranes, W. No. 38272	721,877.99
2 tugboats, W. No. 50805	284,297.86
3 dump barges, W. No. 56562	122,187.00
1 Bucyrus dredge, W. No. 55672	190,903.97
Cristobal firetug landing	63.47
Uncompleted jobs, mechanical division	151,433.02
Uncompleted jobs, other divisions	77,777.20
Total	3,450,586.76

TABLE NO. 6.—*Detail of stores, supplies, and equipment in storehouse, by stores and divisions.*

Balboa store		$2,197,406.84	
Dry dock store		267,633.48	
Paraiso store		518,347.64	
Mount Hope depot		58,116.17	
Medical store		51,815.44	
Fuel oil		99,862.74	
Stationery store, administration building		11,286.67	
District quartermaster store:			
Cristobal	$4,890.47		
Gatun	13,111.79		
Paraiso	952.06		
Corozal	8,282.24		
Balboa	5,965.26		
		33,201.82	
Printing plant store		46,573.55	
Total, quartermaster's stores			$3,284,244.35
Obsolete store			611,838.35
Material on hand with divisions, not yet charged to the work			433,120.51
Containers in transit			45,656.89
Total			4,374,860.10

TABLE No. 7.—*Panama Canal operation and maintenance to June 30, 1915.*

	Fiscal year 1914.	Fiscal year 1915.	Total to date.
Civil government	$5,940.58	$229,624.06	$235,564.64
Health department	10,697.69	247,352.91	258,050.60
Administration	16,839.75	903,428.56	920,268.31
OPERATION AND MAINTENANCE.			
Admeasurement of vessels	740.71	9,926.54	10,667.25
Local inspection	752.10	3,926.98	4,679.08
Aids to navigation	812.12	48,059.59	48,871.71
Pilotage	263.42	61,513.50	61,776.92
Damages to vessels		2,417.07	2,417.07
Maintenance of transportation tracks		37,171.63	37,171.63
Operation of locks	4,274.16		4,274.16
Gatun locks:			
Superintendence		17,398.37	17,398.37
Operation		101,494.91	101,494.91
Maintenance—			
Operating machinery and equipment	49,625.49	35,430.88	85,056.37
And care of emergency dams	2,496.60	12,478.11	14,974.71
Gates	404.18	3,221.97	3,626.15
Valves		785.28	785.28
Towing track system	1,779.72	6,672.71	8,452.43
Towing locomotives, lines and hawsers		14,804.94	14,804.94
Lighting and telephone system		2,760.35	2,760.35
Power control and lighting cables		343.51	343.51
Structures		25,722.17	25,722.17
Back fill		6,382.96	6,382.96
Miscellaneous supplies and expenses		2,718.52	2,718.52
Gatun spillway:			
Operation		1,128.50	1,128.50
Maintenance—			
Operating machinery and equipment	1,719.67	1,237.70	2,957.37
Gates and caissons	951.24	3,663.40	4,614.64
Structures		6,082.60	6,082.60
Gatun dam—maintenance	315.10	48,458.19	48,773.29
Pedro Miguel locks:			
Superintendence		14,921.07	14,921.07
Operation		78,964.47	78,964.47
Maintenance—			
Operating machinery and equipment	19,444.89	23,245.85	42,690.74
And care of emergency dams	2,449.53	6,914.46	9,363.99
Gates	407.92	1,941.63	2,349.55
Valves		243.22	243.22
Towing track system	217.35	448.54	665.89
Towing locomotives, lines and hawsers		9,808.40	9,808.40
Lighting and telephone system		2,489.34	2,489.34
Power control and lighting cables		884.00	884.00
Structures		9,584.95	9,584.95
Back fill	114.86	15,800.96	15,915.82
Miscellaneous supplies and expenses		1,952.18	1,952.18
Pedro Miguel dam—maintenance		42.00	42.00
Miraflores locks:			
Superintendence		17,323.13	17,323.13
Operation		102,239.26	102,239.26
Maintenance—			
Operating machinery and equipment	19,327.72	17,163.70	36,491.42
And care of emergency dams	1,824.31	7,497.89	9,322.20
Gates	1,696.38	24,550.93	26,247.31
Valves		10,616.75	10,616.75
Towing track system	86.54	1,045.17	1,131.71
Towing locomotives, lines and hawsers		7,711.81	7,711.81
Lighting and telephone system		2,187.47	2,187.47
Power control and lighting cables		135.48	135.48
Structures		11,591.96	11,591.96
Back fill		12,659.01	12,659.01
Miscellaneous supplies and expenses		3,324.44	3,324.44
Miraflores east dam and spillway:			
Operation		696.95	696.95
Maintenance of operating machinery and equipment	560.75	5,104.84	5,665.59
Maintenance of gates and caissons	143.52	3,118.43	3,261.95
Maintenance of structures	151.78	755.23	907.01
Miraflores west dam—maintenance		377.17	377.17
Dredging:			
Atlantic entrance		125,563.30	125,563.30
Gaillard Cut		1,633,030.06	1,633,030.06
Miraflores Lake		2,253.44	2,253.44
Pacific entrance		8,628.79	8,628.79

TABLE No. 7.—*Panama Canal operation and maintenance to June 30, 1915*—Contd.

	Fiscal year 1914.	Fiscal year 1915.	Total to date.
OPERATION AND MAINTENANCE—continued.			
Maintenance—Gatun Lake	$16,570.44	$14,488.51	$31,058.95
Gatun-Mindi levee—maintenance		26,939.54	26,939.54
Colon breakwater—maintenance		134.54	134.54
Naos Island breakwater—maintenance		4,492.21	4,492.21
Operation of harbor tugs		2,491.77	2,491.77
Shop expense—Balboa—balance		19,158.55	19,158.55
Loss on sales and services to outsiders (Table No. 23)	5,422.39	56,400.78	61,823.17
Total	166,030.91	4,123,128.09	4,289,159.00
Tolls earned	14,618.63	4,343,383.69	4,358,002.37
Expenses in excess of tolls earned	151,412.23		
Tolls earned in excess of expenses		220,255.60	68,843.37

NOTE.—From the tolls collected, refunds will be made in accordance with Attorney General's opinion

TABLE No. 8.—*Detail of assets received from the Canal Zone Government.*

	Amount.
Schoolhouse buildings	$69,515.00
Roads	451,887.50
Waterworks and sewer system	18,500.00
Stationery stock	2,167.04
Total	542,069.54

TABLE No. 9.—*Detail of assets transferred to other departments of United States Government.*

		Amount.
To Army on Canal Zone:		
Buildings—		
Corozal	$205,073.50	
Cristobal	22,261.51	
Culebra	244,586.41	
Empire	34,694.99	
Gatun	18,536.41	
Margarita Island	325.50	
Toro Point	24,076.24	
		$549,554.56
Roads		249,200.00
Waterworks and sewer system		361,550.00
Total		1,160,304.56

TABLE No. 10.—*Detail of Panama Canal property operated by Panama Railroad.*

		Amount.
Floating equipment		$82,597.77
Rolling stock		731,536.74
Machinery		3,415.72
Docks, wooden:		
Cristobal	$62,000.00	
Balboa	8,100.00	
		70,100.00
Steamships:		
Colon	400,000.00	
Panama	400,000.00	
		800,000.00
Total		1,687,650.23

TABLE No. 11.—*Detail of Panama Railroad property operated by Panama Canal.*

		Amount.
Buildings		$325,300.00
Floating equipment		38,585.00
Rolling stock		15,820.32
Machinery		5,755.00
Gamboa gravel plant		79,961.28
Concrete dock, Balboa:		
Cost of construction	$389,314.69	
Depreciation	15,572.59	
		373,742.10
Total		839,163.70

TABLE No. 12.—*Statement of appropriations by Congress.*

Canal rights from French company (act of June 28, 1902)		$40,000,000.00
Canal Zone rights from Republic of Panama (act of Apr. 28, 1904)		10,000,000.00
Canal connecting Atlantic and Pacific Oceans:		
Act of June 28, 1902	$10,000,000.00	
Act of Dec. 21, 1905	11,000,000.00	
		21,000,000.00
Deficiency for fiscal year 1906 (act of Feb. 27, 1906):		
Miscellaneous material purchases in United States	1,000,000.00	
Miscellaneous material purchases on Isthmus	400,000.00	
Payments to Panama Railroad Co	200,000.00	
Isthmus pay rolls	2,100,000.00	
Salaries and services in the United States	75,000.00	
New equipment purchases	1,565,786.00	
Reequipment of Panama Railroad	650,000.00	
		5,990,786.00
Total for purchase of rights and for lump-sum appropriations common to all departments		76,990,786.00
Expenses in the United States:		
Salaries	$1,476,056.33	
Incidental expenses	583,179.36	
		2,059,235.69
Construction and engineering:		
Pay of officers and employees	29,443,212.00	
Pay of skilled and unskilled laborers	101,809,961.00	
Miscellaneous material purchases, etc	109,881,514.24	
Incidental expenses on Isthmus	6,640,250.00	
Construction and equipment (act of Mar. 3, 1915)	10,500,000.00	
		258,274,937.24
Civil administration:		
Pay of officers and employees	4,507,000.00	
Pay of skilled and unskilled laborers	191,000.00	
Material and expenses	1,178,200.00	
		5,876,200.00
Sanitary department:		
Pay of officers and employees	5,391,000.00	
Pay of skilled and unskilled laborers	3,036,968.00	
Material and expenses	5,662,367.15	
		14,090,335.15
Reequipment of Panama Railroad		4,185,000.00
Relocation of Panama Railroad		7,815,000.00
Redemption of first-mortgage bonds of Panama Railroad Co		2,298,367.50
Sanitation in the cities of Panama and Colon		800,000.00
Survey of lands, Canal Zone		75,000.00
Relief of Pembroke B. Banton for injuries		10,000.00
Total for fiscal years 1907 to 1915, inclusive (detailed statement follows)		295,484,075.58
Total for canal construction, rights, etc., to June 30, 1915		372,474,861.58

Private acts for relief:		
Elizabeth G. Martin, June 17, 1910	$1,200.00	
Marcellus Troxell, Jan. 13, 1911	1,500.00	
W. L. Miles, Feb. 13, 1911	1,704.18	
Chas. A. Caswell, Mar. 2, 1911	1,056.00	
Heirs of Robert S. Gill, July 3, 1912	2,520.00	
Douglas B. Thompson, July 3, 1912	1,500.00	
Allesandra Comba, July 10, 1912	500.00	
Peter Wiggington, Feb. 7, 1913	500.00	
Raymond R. Ridenour, Feb. 7, 1913	500.00	
Heirs of Chas. E. Stump, Feb. 7, 1913	1,500.00	
Parents of Edward Maher, Feb. 18, 1913	1,980.00	
Oscar F. Lackey, Feb. 18, 1913	1,500.00	
Pedro Sanchez, Feb. 18, 1913	2,000.00	
John H. Cole, Feb. 18, 1913	1,951.38	
Robert Coggen, Feb. 18, 1913	1,500.00	
Wife of William Goodley, July 17, 1914	1,000.00	
John Burrows, Feb. 27, 1915	1,433.33	
F. W. Theodore Schroeter, Mar. 3, 1915	1,397.66	
L. V. Thomas, Mar. 3, 1915	1,680.00	
		$26,922.55
Judgment of the Court of Claims, war:		
Act of Aug. 26, 1912	196.45	
Act of Mar. 4, 1913	900.00	
Act of July 29, 1914	905.38	
		2,001.83
Judgment, United States Court—act of Apr. 6, 1914		9,489.76
Presenting steam launch *Louise* to French Government—act of Aug. 25, 1914		6,000.00
Fortifications:		
Armament of fortifications	$4,672,000.00	
Army quarters, storehouses, etc	1,990,000.00	
Buildings and materials	57,375.00	
Causeway	150,000.00	
Electric light and power plants	209,631.00	
Field fortifications and camps	394,350.00	
Fire control	633,301.30	
Land for military purposes	50,000.00	
Maintenance of clearings and trails	66,900.00	
Maintenance of searchlight and electric power equipment	7,500.00	
Preservation and repair of fortifications	15,000.00	
Reserve equipment for fortifications	50,000.00	
Sanitary clearing, filling, etc	210,000.00	
Seacoast batteries	5,365,000.00	
Searchlights for seacoast fortifications	364,666.00	
Submarine mines	116,950.00	
Submarine mine structures	275,200.00	
Surveys	62,000.00	
		14,689,873.30
Annual payment to Republic of Panama:		
Act of Mar. 4, 1913	250,000.00	
Act of Apr. 6, 1914	250,000.00	
Act of Jan. 25, 1915	250,000.00	
		750,000.00
Maintenance and operation of the canal:		
Maintenance and operation—act of Mar. 3, 1915	5,200,000.00	
Sanitation, Canal Zone—act of Mar. 3, 1915	700,000.00	
Civil government, Panama Canal Zone—act of Mar. 3, 1915	540,000.00	
		6,440,000.00
Total appropriations by Congress to June 30, 1915		394,399,149.02

TABLE 12.—*Statement of appropriations by Congress*—Continued.

	Total.	Act of June 30, 1906 (fiscal year 1907).	Acts of Mar. 4, 1907, and Feb. 15, 1908 (fiscal year 1908).	Acts of May 27, 1908, and Mar. 4, 1909 (fiscal year 1909).	Acts of Mar. 4, 1909, and Feb. 25, 1910 (fiscal year 1910).	Act of June 25, 1910 (fiscal year 1911).	Act of March 4, 1911 (fiscal year 1912).	Act of Aug. 24, 1912 (fiscal year 1913).	Acts of June 23, 1913, and Apr. 6, 1914 (fiscal year 1914).	Acts of Aug. 1, 1914, and Mar. 3, 1915 (fiscal years 1915 and 1916).
Expenses in the United States:										
Salaries	$1,476,056.33	$251,063.33	$202,600.00	$149,000.00	$150,000.00	$140,000.00	$130,000.00	$150,000.00	$153,393.00	$150,000.00
Incidental expenses	583,179.36	117,179.36	69,000.00	27,000.00	75,000.00	70,000.00	50,000.00	50,000.00	63,000.00	62,000.00
Construction and engineering:										
Officers and employees	29,443,212.00	2,650,512.00	2,982,700.00	4,000,000.00	3,871,000.00	3,900,000.00	3,900,000.00	3,000,000.00	2,725,000.00	2,414,000.00
Skilled and unskilled laborers	101,809,961.00	9,050,661.00	13,526,300.00	10,858,000.00	12,000,000.00	13,500,000.00	16,500,000.00	11,000,000.00	8,375,000.00	7,000,000.00
Miscellaneous material purchases	109,881,514.24	9,032,814.24	15,131,700.00	15,200,000.00	10,517,000.00	15,000,000.00	19,000,000.00	12,000,000.00	5,000,000.00	9,000,000.00
Incidental expenses on Isthmus	6,640,250.00	434,550.00	715,700.00	400,000.00	1,000,000.00	900,000.00	950,000.00	790,000.00	725,000.00	725,000.00
Construction and equipment	10,500,000.00	....	....	....	....	....	....	....	....	10,500,000.00
Civil administration:										
Officers and employees	4,507,000.00	600,000.00	486,000.00	225,000.00	546,000.00	600,000.00	550,000.00	500,000.00	500,000.00	500,000.00
Skilled and unskilled laborers	191,000.00	50,000.00	50,000.00	16,000.00	20,000.00	20,000.00	20,000.00	15,000.00	....	....
Material and expenses	1,178,200.00	318,200.00	289,000.00	....	140,000.00	100,000.00	110,000.00	75,000.00	74,000.00	72,000.00
Sanitary department:										
Officers and employees	5,391,000.00	550,000.00	766,000.00	700,000.00	725,000.00	600,000.00	600,000.00	700,000.00	450,000.00	300,000.00
Skilled and unskilled laborers	3,036,968.00	579,068.00	637,900.00	500,000.00	450,000.00	200,000.00	200,000.00	200,000.00	150,000.00	120,000.00
Material and expenses	5,662,367.15	822,367.15	800,000.00	375,000.00	740,000.00	750,000.00	800,000.00	500,000.00	500,000.00	375,000.00
Reequipment of Panama Railroad	4,185,000.00	1,000,000.00	1,385,000.00	1,100,000.00	700,000.00	....	....	....	....	....
Relocation of Panama Railroad	7,815,000.00	....	....	1,085,000.00	1,980,000.00	2,000,000.00	2,750,000.00	....	....	....
Redemption of Panama Railroad first-mortgage bonds	2,298,367.50	....	2,298,367.50	....	....	....	....	....	....	....
Sanitation, Panama and Colon	800,000.00	....	....	....	800,000.00	....	....	....	....	....
Survey of lands, Canal Zone	75,000.00	....	....	....	....	75,000.00	....	....	....	....
Pembroke B. Banton, for injuries	10,000.00	....	....	10,000.00	....	....	....	....	....	....
Total regular fiscal year appropriations	275,321,175.58	25,456,415.08	27,161,367.50	29,187,000.00	33,638,000.00	37,855,000.00	45,560,000.00	28,980,000.00	16,265,393.00	31,218,000.00
Total deficiency appropriations	20,162,900.00	....	12,178,900.00	5,458,000.00	76,000.00	....	....	....	2,450,000.00	....
Total for fiscal years 1907 to 1915, inclusive, less fortifications	295,484,075.58	25,456,415.08	39,340,267.50	34,645,000.00	33,714,000.00	37,855,000.00	45,560,000.00	28,980,000.00	18,715,393.00	31,218,000.00

NOTE.—Above appropriations while made primarily for fiscal years were made available until expended; those for 1912, 1913, 1914, 1915, and 1916 were made immediately available.

TABLE NO. 13.—*Detail of reserves.*

			Amount.
For gratuity			$715,651.80
For depreciation:			
Structures—			
Shop buildings	$28,240.00		
Power producing and transmitting system	67,028.70		
Docks and piers	15,572.59		
Waterworks systems	36,863.13		
		$147,704.42	
Equipment and tools—			
Mechanical division	31,762.20		
Storehouses	3,210.02		
Dredging division	214,708.59		
Fortifications division	3,383.94		
Building division	426.99		
Terminal construction division	2,712.50		
Corrals	31,365.72		
Marine division	3,833.36		
Gatun locks division	[1] 423.97		
Pacific locks division	[1] 3,813.99		
Balboa power house	30,607.34		
Electrical division	6,050.80		
Health department	22,510.10		
Colon breakwater	8.85		
		346,342.45	
			494,046.87
For repairs:			
Structures—			
Balboa shop buildings	9,832.86		
Storehouses	2,688.00		
Quarters	[1] 23,592.35		
Power producing and transmitting system	[1] 3,199.14		
		[1] 14,270.63	
Equipment—			
Mechanical division	34,600.17		
Storehouses	4,052.01		
Dredging division	172,800.92		
Marine division	10,643.73		
Pacific locks division	[1] 1,612.04		
		220,484.79	
			206,214.16
Total			1,415,912.83

[1] Debit balance.

TABLE NO. 14.—*Detail of miscellaneous receipts, United States funds.*

		Amount.
Receipts involving no direct appropriation expenditures:		
Subsidies from Panama Railroad Company	$631,875.00	
Dividends on Panama Railroad stock	344,945.00	
Interest, reequipment loan	320,799.11	
Interest, first mortgage bond loan	152,395.16	
Miscellaneous rentals	238,650.08	
Interest, public works, Panama and Colon	175,491.44	
Interest, Zone water supply systems, proportion	51,109.11	
Pay-car averages	476.42	
		$1,915,741.32
Receipts involving direct expenditure from appropriations:		
Not credited to assets—		
Capital cost, Panama waterworks and sewers	13,506.81	
Capital cost, Panama pavements	11,740.97	
Capital cost, Colon waterworks and sewers	12,994.99	
Capital cost, Colon pavements	11,518.23	
Tolls	4,358,002.37	
		4,407,763.37
Credited to assets—		
Sale of property	850,500.11	
Sale of French material and equipment	95,603.59	
Sale of Panama Canal building, city of Panama	80,000.00	
Sale of water	255.43	
Mess accounts	46,879.48	
Hospital receipts	79,992.68	
Quarantine receipts	21,900.53	
Laundry receipts	7,382.01	
Rental of lands and buildings	41,427.24	
Rentals, miscellaneous	137,822.99	

TABLE No. 14.—*Detail of miscellaneous receipts, United States funds*—Continued.

		Amount.
Receipts involving direct expenditure from appropriations—Continued.		
Credited to assets—Continued.		
Telegraph and telephone receipts	$3,547.35	
Hotels and messes	758,470.34	
Hotel coupon books	32,238.28	
Corral receipts	8,628.56	
Labor furnished Panama Railroad Company	180,336.97	
Other labor furnished	27,449.55	
Repayment, reequipment loan	1,387,714.92	
Repayment, first mortgage bond loan	300,000.00	
Sale of Panama Railroad stock	1,300.00	
Miscellaneous	93,740.47	
Sale of construction material and equipment	439,375.03	
		$4,597,565.56
Total		10,921,070.25
Miscellaneous receipts deposited in United States Treasury		10,601,312.29
Balance in hands of collector, June 30, 1915		319,727.96
Total		10,921,070.25

TABLE No. 15.—*Detailed cost, Colon East Breakwater, to June 30, 1915.*

	Quantities.	Amount.	Unit cost.
COLON EAST BREAKWATER, CONSTRUCTION.			
Preliminary and general work: Pipe line and relay pump installation	*Cubic yards.*	$107,193.64	
Trestle construction:			
Trestle, double track ... linear feet	9,498	453,919.89	$47.7911
Maintenance of equipment ... do	9,498	17,963.23	1.8913
Division expense ... do	9,498	15,815.17	1.6651
Total division cost ... do	9,498	487,698.29	51.3475
Trestle reconstruction:			
Salvaging material		24,658.85	
Trestle, single track ... linear feet	4,875.8	65,340.73	13.4010
Maintenance of equipment		2,272.75	
Division expense		9,226.59	
Total division cost		101,498.92	
Dry filling (a) by plowing off Lidgerwood cars:			
Excavation from Sosa Hill	321,146	190,157.76	.5921
Transportation	321,146	51,563.21	.1605
Dumping	321,146	20,271.27	.0632
Trestle maintenance	321,146	11,714.43	.0364
Track maintenance	321,146	4,518.39	.0140
Maintenance of equipment—			
Cars	321,146	38,838.60	.1209
Unloaders	321,146	3,469.49	.0108
Plows	321,146	1,635.74	.0052
Miscellaneous	321,146	365.71	.0012
Division expense	321,146	4,093.66	.0127
Total division cost	321,146	326,628.26	1.0170
Dry filling (b) placing with derrick barges:			
Reloading from storage		77.70	
Water transportation		46.76	
Placing armor		865.92	
Division expense		55.85	
Total division cost		1,046.23	
Filling, hydraulic:			
Borings and surveys	252,319	1,826.71	.0072
Operation pipe-line dredges (dredging)	252,319	51,518.52	.2042
Maintenance pipe-line dredges (dredging)	252,319	32,433.37	.1285
Operation pipe-line dredges (relaying)	99,945	26,820.79	.2630
Maintenance pipe-line dredges (relaying)	99,945	10,614.93	.1062
Operation miscellaneous floating equipment	252,319	3,029.25	.0120
Maintenance miscellaneous floating equipment	252,319	1,232.59	.0049
Operation relay pumps	252,319	3,568.76	.0141

TABLE No. 15.—*Detailed cost, Colon East Breakwater, to June 30, 1915*—Continued.

	Quantities.	Amount.	Unit cost.
COLON EAST BREAKWATER, CONSTRUCTION—continued.			
Filling, hydraulic—Continued.	*Cubic yards.*		
Maintenance relay pumps	252,319	$2,389.62	$0.0095
Pipe lines	252,319	11,406.49	.0452
Channel lights	252,319	231.20	.0009
Division expense	252,319	8,164.00	.0323
Total division cost	252,319	153,236.23	.6073
Total division cost Colon east breakwater		1,177,301.57	

NOTE.—Total shown on statement of construction of canal (Table No. 3) includes $384,372.82, being cost of preliminary work and construction equipment to be absorbed in the various units of the work as construction progresses.

TABLE No. 16.—*Detailed cost, aids to navigation, to June 30, 1915.*

Item.		Amount.
Preliminary work		$49,172.18
Sailing chart, preparation		1,018.67
East breakwater beacon		1,616.00
West breakwater light		28,990.50
West breakwater beacon		7,925.03
Beacon No. 1, Atlantic		1,675.94
Beacon No. 2, Atlantic		581.83
Beacon No. 3, Atlantic		704.56
Beacon No. 4, Atlantic		2,185.63
Tower No. 5, Atlantic		5,393.56
Tower No. 6, Atlantic		3,199.70
Tower No. 1, lake		6,490.51
Tower No. 2, lake		12,401.92
Tower No. 3, lake		3,715.14
Tower No. 4, lake		3,048.73
Tower No. 5, lake		7,816.56
Tower No. 6, lake		3,926.86
Tower No. 7, lake		3,082.25
Tower No. 8, lake		4,479.83
Tower No. 9, lake		3,095.56
Tower No. 10, lake		3,614.72
Tower No. 12, lake		5,508.27
Tower No. 13, lake		4,297.56
Tower No. 14, lake		3,224.77
Tower No. 15, lake		4,209.71
Tower No. 16, lake		4,724.24
Tower No. 17, lake		4,523.08
Tower No. 18, lake		5,971.96
Tower No. 19, lake		4,233.49
Tower No. 21, lake		3,205.27
Tower No. 22, lake		3,237.14
Tower No. 23, lake		6,744.68
Tower No. 24, lake		2,370.13
Tower No. 25, lake		4,144.51
Tower No. 26, lake		4,169.97
Beacon No. 11, lake		2,398.49
Beacon No. 27, lake		231.69
Beacon No. 28, lake		1,390.53
Beacon No. 29, lake		207.84
Beacon No. 30, lake		1,028.66
Beacons Nos. 1-37, Gaillard Cut		19,141.80
Beacon No. 38, Gaillard Cut		1,273.97
Tower No. 1, Pacific		7,710.79
Tower No. 2, Pacific		4,940.77
Tower No. 3, Pacific		8,335.78
Tower No. 4, Pacific		7,370.74
Tower No. 12, Pacific		2,408.56
Tower No. 13, Pacific		2,146.37
Beacon No. 5, Pacific		2,724.59
Beacon No. 6, Pacific		823.70
Beacon No. 7, Pacific		2,141.93
Beacon No. 8, Pacific		2,042.10
Beacon No. 9, Pacific		819.04
Beacon No. 10, Pacific		$357.00
Beacon No. 11, Pacific		148.58
Beacon No. 17, Pacific		731.58
Beacon No. 19, Pacific		719.39
Beacon No. 21, Pacific		731.43
Punta Mala light		3,058.44
Punta Mala keeper's house		1,346.49
Bona Island light		312.71
Reference targets		8,979.53
Reference points		148.55
Temporary lights, Pacific entrance		692.81
Transmission lines:		
Atlantic entrance, east	$5,425.92	
Atlantic entrance, west	4,154.22	
To Tower No. 25, lake	101.30	
To Tower No. 28, lake	1,131.70	
Bas Obispo conduit	8,236.97	
Bas Obispo to Pedro Miguel	22,668.56	
Pacific entrance, east	4,575.56	
Pacific entrance, west	1,936.26	
Total transmission lines		48,230.49
Gas buoys, general, installation [1]		12,526.42
Gas buoys, 22-foot shoal, Limon Bay		772.43
Spar buoys		17,847.49
Anchorage, Gamboa		8,666.64
Mooring wharf, Empire		987.45
Mooring posts, Pedro Miguel		48.15
Mooring buoys, Balboa		803.14
Concrete dock, Gatun		5,276.14
Signal stations:		
Washington Hotel	$25.89	
Gamboa	3,874.72	
Empire	3,477.34	
Cucaracha	49.44	
Arrow, Gatun	988.18	
Arrow, Pedro Miguel	1,046.52	
Arrow, Miraflores	941.51	
Total signal stations		10,403.60
Whistle signs, Gaillard Cut		280.57
Telephone system, Balboa to Flamenco Island		525.44
Experimental illumination		1,293.92
Spare parts:		
Beacons, common	$1,730.26	
Beacon lanterns	843.63	
Buoy sinkers	286.06	
Total spare parts		2,859.95
Total division cost		409,586.15

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[1] $181,892.70, covering value of gas buoys, is now carried in equipment account.

TABLE NO. 17.—*Detailed cost, transmission system, to June 30, 1915.*

	Amount.
Surveys and testing	$16,477.06
Inspection	19,727.16
Towers (815 in number):	
Tower erection	769,651.94
Average cost per tower	944.36
Insulators and wires (44.46 miles):	
Hanging insulators and stringing wires	276,615.42
Average cost per mile	6,221.67
Duct lines:	
Gatun	154,947.25
Pedro Miguel	129,075.36
Miraflores	35,024.20
Total division cost	319,046.81
Distribution lines:	
Balboa duct line to docks	14,136.75
Power line from Miraflores substation to pump station No. 2	1,058.54
Value of meters charged to transmission system	406.23
Total division cost	15,601.52
Transformer substations:	
Cristobal—	
Building	192,375.24
Original cost of equipment	69,811.91
Installation of equipment	27,013.78
Total division cost	289,200.93
Transformer substations—Continued.	
Gatun—	
Building	$185,949.27
Original cost of equipment	92,652.80
Installation of equipment	35,563.41
Total division cost	314,165.48
Miraflores—	
Building	188,083.75
Original cost of equipment	102,450.01
Installation of equipment	45,982.68
Total division cost	336,516.44
Balboa—	
Building	159,329.86
Original cost of equipment	93,888.91
Installation of equipment	27,979.48
Total division cost	281,198.25
Gamboa—	
Building	7,953.27
Original cost of equipment	15,821.76
Total division cost	23,775.03
Total division cost transmission system	2,661,976.04

TABLE NO. 18.—*Detailed cost, Cristobal terminals, to June 30, 1915.*

	Quantities.	Amount.	Unit cost.
COALING PLANT.			
Miscellaneous:	*Cubic yards.*		
Designing		$12,220.28	
Surveys		6,743.05	
Boring and test pits		147.76	
Inspection in the United States		41,509.31	
Inspection on the Isthmus		40,376.47	
Temporary tracks		4,129.05	
Division expense		7,088.51	
Total division cost		112,214.43	
Dredging:			
Clearing	697,908	2,199.29	$0.0032
Operation dipper dredges	73,623	4,351.72	.0591
Maintenance dipper dredges	73,623	4,458.48	.0606
Operation ladder dredges	204,624	22,478.80	.1099
Maintenance ladder dredges	204,624	12,989.46	.0635
Operation tugs and clapets	278,247	14,762.91	.0531
Maintenance tugs and clapets	278,247	5,546.09	.0199
Operation pipe-line dredges	419,661	72,890.63	.1737
Maintenance pipe-line dredges	419,661	69,667.14	.1660
Pipe lines	419,661	21,818.74	.0520
Dikes	419,661	7,632.19	.0182
Channel lights	697,908	233.36	.0003
Drilling	697,908	49,786.37	.0713
Blasting	697,908	48,043.85	.0688
Operation miscellaneous floating equipment	697,908	1,502.21	.0022
Maintenance miscellaneous floating equipment	697,908	1,722.58	.0025
Maintenance drill barges	697,908	2,981.64	.0043
Plant arbitrary	697,908	11,454.25	.0164
Division expense	697,908	18,736.63	.0268
Total division cost	697,908	[1] 373,256.34	.5348
Coal pocket and wharves [1]	247,523	130,763.10	.5283
Basin alongside	450,385	242,493.24	.5384
Foundations, retaining wall construction:			
Surveys		1,729.86	
Piling in place ... linear feet	89,993	42,626.22	.4737
Excavation for foundations	5,127	6,306.94	1.2294

[1] This statement includes $4,678.35 carried in general balance sheet, in "Work in progress."

TABLE No. 18.—*Detailed cost, Cristobal terminals, to June 30, 1915*—Continued.

	Quantities.	Amount.	Unit cost.
Foundations, retaining wall construction—Continued.	*Cubic yards.*		
Concrete	6,996	$30,246.87	$4.3235
Reinforcement in place		1,525.67	
Fixed irons in place		2,681.61	
Forms for retaining wall		6,841.46	
Maintenance of equipment		3,750.97	
Plant arbitrary		7,130.45	
Division expense		5,191.22	
Total division cost		108,031.27	
Foundations, caisson construction:			
Surveys		3,328.68	
Cylinders in place ... linear feet	15,065	61,373.13	4.0739
Cost of steel cylinders ... do	15,065	150,740.05	10.0060
Excavation in cylinders	15,132	32,578.26	2.1529
Concrete in cylinders	17,953	84,259.71	4.6933
Reinforcements for cylinders		54,029.44	
Trestles		56,053.14	
Forms for cylinders		3,050.58	
Ties between cylinders		5,420.23	
Fixed irons in place		5,625.67	
Maintenance of equipment		15,215.60	
Plant arbitrary		45,114.04	
Division expense		29,580.23	
Total division cost		546,368.76	
Backfilling:			
Transportation	44,210	567.64	.0128
Tracks	44,210	75.29	.0017
Filling and grading	44,210	7,136.92	.1614
Maintenance of equipment	44,210	2,975.31	.0673
Division expense	44,210	1,354.72	.0306
Fill for permanent storage yard	69,125	18,336.49	.2653
Total division cost	113,335	30,446.37	.2686
Floor:			
Surveys		1,319.61	
Reinforcements in place		16,288.40	
Fixed irons in place		5,665.29	
Concrete for floors	6,577	30,167.94	4.5869
Forms for floors		34,041.36	
Strutural steel decking		246,619.47	
Plant arbitrary		2,459.98	
Division expense		7,768.28	
Total division cost		344,330.33	
Superstructure:			
Steel erection		496,477.46	
Excavation for girders	960	896.66	.9340
Plant arbitrary		1,712.61	
Division expense		328.73	
Total division cost		499,415.46	
Accessories:			
Installation of controlling devices		421.70	
Foundations for transformer house		2,525.89	
Installation of electrical equipment		3,550.70	
Plant arbitrary		193.10	
Division expense		320.61	
Total division cost		7,012.00	
Miscellaneous:			
Tracks and fastenings		22,766.92	
Concrete in permanent tracks		34.11	
Track scales		1,184.51	
Fender system		4,451.42	
Riprapping		1,871.19	
Permanent water mains		1,219.56	
Division expense		1,308.18	
Total division cost		32,835.89	
Total division cost coaling plant		1,680,654.51	
Total division cost coaling plant, including dredging		2,053,910.85	

Table No. 18.—*Detailed cost, Cristobal terminals, to June 30, 1915*—Continued.

	Quantities.	Amount.	Unit cost.
FUEL-OIL-HANDLING PLANT.			
Storage, United States tanks Nos. 1 and 2:	*Cubic yards.*		
Surveys		$298.68	
Land damages		2,415.00	
Roadways		3,765.70	
Tank foundations		4,505.85	
Contract price		31,330.13	
Concrete gutters and aprons		1,103.37	
Painting		2,119.31	
Miscellaneous pipe line connections		3,642.12	
Miscellaneous charges		162.27	
Design and supervision		2,236.81	
Total division cost		51,579.24	
Oil-pump plant:			
Boiler and pump house—			
General		6,515.88	
Design and supervision		2,805.80	
Structure		8,119.44	
Concrete drain sewers		2,910.18	
Machinery foundations		2,666.97	
Cost of equipment		13,449.28	
Brick setting		3,009.15	
Installation boiler and stack		2,155.52	
Installation auxiliary apparatus		4,313.30	
Installation steam and water fittings		3,844.43	
Installation oil pumps		1,033.26	
Electrical installation		209.73	
Manifold—			
Foundations		1,039.92	
Installation		15,236.62	
Total division cost		67,309.48	
Oil docks:			
Design and supervision		108.47	
Preliminary and general work		12.03	
Total division cost		120.50	
Pipe lines:			
Installation 10-inch lines		8,447.36	
Installation 12-inch lines		10,986.96	
Installation 10-inch line to Gatun		1,679.04	
Total division cost		21,113.36	
Total division cost oil fuel storage		140,122.58	
Gasoline storage:			
Tanks		21.24	
Design and supervision		46.82	
Total division cost gasoline storage		68.06	
Total division cost oil fuel and gasoline storage		140,190.64	
Note.—Cost of tank farm borne by Panama Railroad Co.			
Total division cost Cristobal terminals		2,194,101.49	

Table No. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915.*

	Quantities.	Amount.	Unit cost.
PREPARING SITES, GENERAL.			
Preliminary and general work:	*Cubic yards.*		
Surveys		$29,820.08	
Clearing site		13,047.93	
Boring and test pits		1,297.82	
Removal of buildings		67,579.19	
Removal and rearrangement of Panama R. R. tracks		99,131.83	
Removal and construction of water mains		20,030.15	
Panama R. R. dock		10,385.99	
Removal of quartermaster material yard		5,603.56	
Construction new dredge landing		1,304.02	
Removal of landing stage for Union Oil Co.		10,627.07	

TABLE No. 19.—*Detailed cost, terminal facilities, Balboa, to June 30. 1915*—Contd.

	Quantities.	Amount.	Unit cost.
PREPARING SITES, GENERAL—continued.			
Preliminary and general work—Continued	*Cubic yards.*		
General tracks		$53,013.85	
Drainage around Balboa wye and yards		699.36	
Division expense		10,695.75	
Total division cost		323,242.60	
Preparing sites, general:			
Fill between Panama R. R. yard and back line of piers from stations 0 to 30	168,906	63,652.35	$0.3769
Fill back of quay wall "D-E" to station 12, west end of building No. 1	18,761	16,021.81	.8540
Fill for Panama R. R. yard to Diablo	560,915	257,559.95	.4592
Diablo Hill excavation	233,300	88,397.46	.3789
Sosa Hill and Sosa Dam excavation	418,562	245,457.01	.5864
Concrete drain ditch, Sosa Hill	368	5,003.12	13.5954
Division expense		5,042.57	
Total division cost		681,134.27	
Curundu River drainage culvert:			
Preliminary and general work—			
Surveys		288.06	
Designing		24.00	
Total		312.06	
Foundations—			
Clearing		153.16	
Excavation by hand	2,471	3,786.11	1.5322
Wooden piles ... linear feet	18,412	16,883.55	.9170
Back filling		111.59	
Pumps		328.88	
Total		21,263.29	
Concrete—			
Concrete	1,664	12,121.64	7.2846
Reinforcements		4,460.93	
Pumps		909.36	
Tracks		29.71	
Tidal gate		144.53	
Total		17,666.17	
Division expense		1,895.49	
Total division cost		41,137.01	
Total division cost, preliminary work, and preparing site		1,045,513.88	
Dredging inner harbor:			
Clearing	6,510,870	7,587.21	.0012
Operation seagoing suction dredges	93,882	4,064.63	.0433
Repairs seagoing suction dredges	93,882	1,332.77	.0142
Operation small-ladder dredges	1,223,791	61,871.60	.0506
Repairs small-ladder dredges	1,223,791	41,741.84	.0341
Operation 3-yard ladder dredges	10,000	1,166.71	.1167
Repairs 3-yard ladder dredges	10,000	853.11	.0583
Operation small-dipper dredges	15,669	2,179.79	.1388
Repairs small-dipper dredges	15,669	1,072.43	.0683
Operation pipe-line dredges	5,167,501	244,902.37	.0474
Repairs pipe-line dredges	5,167,501	165,595.08	.0320
Operation tugs, clapets, and scows	1,249,490	86,686.59	.0694
Repairs tugs, clapets, and scows	1,249,490	35,909.83	.0287
Operation rock breakers	12,564	1,919.39	.1528
Repairs rock breakers	12,564	2,453.52	.1953
Operation miscellaneous floating equipment	6,510,873	24,933.47	.0038
Repairs miscellaneous floating equipment	6,510,873	17,926.25	.0028
Blasting		63.83	
Pipe lines	5,167,501	53,389.11	.0103
Dikes	5,167,501	2,543.24	.0005
Channel lights	6,510,873	2,097.42	.0003
Ditching	6,510,873	1,974.95	.0003
Lockage	6,510,873	25.22	
Sluicing	6,510,873	2,219.83	.0003
Plant arbitrary	6,510,873	113,432.11	.0174
Division expense	6,510,873	50,551.54	.0078
Total division cost	6,510,873	928,493.84	.1426
Reclaiming land:			
Clearing	5,167,501	459.91	.0001
Pipe lines	5,167,501	21,119.12	.0041
Dikes	5,167,501	74,827.33	.0145

TABLE NO. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd.

	Quantities.	Amount.	Unit cost.
PREPARING SITES, GENERAL—continued.			
Reclaiming land—Continued.	*Cubic yards.*		
Operation relay pumps	5,167,501	$122,862.58	$0.0238
Repairs relay pumps	5,167,501	15,587.43	.0030
Ditching	5,167,501	1,963.63	.0003
Plant arbitrary	5,167,501	1,391.09	.0003
Division expense	5,167,501	9,877.77	.0019
Total division cost	5.167,501	248,088.86	.0480
Total division cost dredging	....	1,176,582.70	....
Entrance basin dry excavation:			
Surveys	401,155	18.17	....
Clearing	401,155	5,488.25	.0137
Drilling	401,155	58,503.11	.1458
Blasting	401,155	39,325.33	.0980
Excavation by power	401,155	35,604.22	.0888
Excavation by hand	401,155	95.80	.0002
Tracks	401,155	52,612.45	.1312
Transportation	401,155	50,265.09	.1253
Incline trestle	401,155	2,020.98	.0050
Dumps	401,155	4,719.56	.0118
Drainage and pumps	401,155	20,095.71	.0500
Maintenance of equipment	401,155	45,147.76	.1125
Plant arbitrary	401,155	52,440.70	.1309
Division expense	401,155	12,952.47	.0323
Total division cost	401,155	379,289.60	.9455
Less spoil for other divisions	4,271	3,203.25	.7500
Net division cost entrance basin	....	376,086.35	....
MAIN DRY DOCK.			
Preliminary and general work:			
Designing	....	$27,595.25	....
Surveys	....	18,330.45	....
Boring and test pits	....	10,657.10	....
Inspection in the United States	....	4,327.31	....
Inspection on the Isthmus	....	238.16	....
Granite from Cocoli Island	....	12.85	....
Testing material	....	1,967.46	....
Construction tracks	....	8,757.11	....
Cleaning up	....	433.36	....
Division expense	....	6,148.15	....
Total division cost	....	78,467.20	....
Dry excavation:			
Clearing	596,885	7,898.96	$0.0131
Drilling	596,885	90,456.87	.1515
Blasting	596,885	59,921.92	.1004
Excavation by power	596,885	53,046.22	.0889
Excavation by hand	596,885	14,785.09	.0248
Tracks	596,885	77,221.07	.1294
Transportation	596,885	79,378.51	.1330
Incline trestle	596,885	3,582.38	.0060
Dumps	596,885	6,792.62	.0114
Drainage and pumps	596,885	26,354.91	.0442
Maintenance of equipment	596,885	74,372.10	.1246
Plant arbitrary	596,885	75,475.42	.1264
Division expense	596,885	21,009.98	.0353
Total division cost	596.885	590,296.05	.9890
Less spoil for other divisions	6,836	5,127.00	.7500
Net division cost	....	585,169.05	....
Preparing foundations:			
Drilling	32,352	11,152.88	.3447
Blasting	32,352	3,057.78	.0945
Excavation	32.352	38,770.56	1.1985
Tracks	32,352	218.43	.0067
Transportation	32,352	6,903.19	.2134
Drainage and pumps	32.352	1,907.84	.0590
Grouting under pressure	32,352	1,339.96	.0414
Maintenance of equipment	32,352	5,721.43	.1768
Division expense	32,352	5,774.35	.1785
Total division cost	32,352	74,846.42	2.3135
Less spoil for other divisions	984	738.00	.7500
Net division cost	....	74 108.42	....

TABLE No. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd.

	Quantities.	Amount.	Unit cost.
MAIN DRY DOCK—continued.			
Concrete masonry, mass:	*Cubic yards.*		
Cement	128,195	$182,970.22	$1.4271
Sand	128,195	38,363.55	.2993
Stone	128,195	95,294.72	.7434
Mixing	128,195	35,792.09	.2792
Forms	128,195	69,528.62	.5424
Placing	128,195	42,205.08	.3292
Drainage and pumps	128,195	420.79	.0033
Maintenance of equipment	128,195	12,823.88	.1000
Plant arbitrary	128,195	17,007.31	.1327
Division expense	128,195	15,097.66	.1178
Total division cost	128,195	509,503.92	3.9744
Concrete masonry, reinforced:			
Cement	24,675	50,415.52	2.0432
Sand	24,675	4,959.94	.2010
Stone	24,675	24,764.48	1.0036
Mixing	24,675	7,888.40	.3197
Forms	24,675	23,058.27	.9345
Placing	24,675	7,954.64	.3224
Reinforcements	24,675	17,500.31	.7092
Maintenance of equipment	24,675	3,472.90	.1407
Plant arbitrary	24,675	3,207.75	.1300
Division expense	24,675	5,579.02	.2261
Total division cost	24,675	148,801.23	6.0304
Granite:			
Handling to site	....	1,088.56	....
Placed in sill	....	6,372.70	....
Placed in walls	....	6,911.30	....
Division expense	....	334.08	....
Total division cost	....	14,706.64	....
Miter gates: Original cost of gates and operating machinery	....	129,691.07	....
Erection of gates:			
Preliminary work	....	6,655.64	....
Handling material to site	....	1,132.08	....
Bolting up and reaming	....	3,062.87	....
Erecting ...tons	565.68	2,274.35	4.0206
Riveting	....	925.60	....
Caulking	....	128.37	....
Painting	....	146.22	....
Inspection	....	233.62	....
Maintenance of equipment	....	679.32	....
Division expense	....	862.77	....
Total division cost	....	16,100.84	....
Back filling:			
Filling in place	33,787	14,208.02	.4205
Division expense	33,787	1,222.34	.0362
Total division cost	33,787	15,430.36	.4567
Miscellaneous:			
Valves, wagon body with machinery and accessories	....	28.79	....
Valves, sluice, with accessories, including housings	....	3,825.40	....
Blocks and fenders	....	259.57	....
Capstans	....	650.83	....
Bollards	....	802.02	....
Gratings	....	4,004.63	....
Sewerage	....	404.88	....
Stairs, extra work	....	794.35	....
Crane tracks	....	31,672.55	....
Structural reinforcement at caisson seat	....	6,173.40	....
Ducts, manholes, transformers, and cables	....	32.49	....
Handrails and stanchions	....	1.79	....
Pump well, motor floor, house over, stairs and fittings	....	164.02	....
Piping and valves for air and water	....	2,226.85	....
Rail reinforcement, including anchoring to rock	....	17,252.02	....
Water stops, yellow metal	....	1,420.20	....
Maintenance of equipment	....	211.43	....
Division expense	....	2,251.56	....
Total division cost	....	72,176.76	....
Total division cost main dry dock	....	1,644,155.49	....

TABLE No. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd.

	Quantities.	Amount.	Unit cost.
ENTRANCE PIER.			
Preliminary and general work:	*Cubic yards.*		
Designs		$3,908.98	
Surveys		1,787 61	
Inspection in the United States		386.14	
Cleaning up		156.28	
Division expense		617.24	
Total division cost		6,856.25	
Dry excavation:			
Clearing	95,363	8.04	$0.0001
Drilling	95,363	5,512.12	.0578
Blasting	95,363	3,257.97	.0342
Excavation by power	95,363	7,356.53	.0771
Excavation by hand	95,363	60.23	.0006
Tracks	95,363	4,803.10	.0504
Transportation	95,363	15,912.38	.1669
Dumps	95,363	780.81	.0082
Drainage and pumps	95,363	3,126.31	.0328
Maintenance of equipment	95,363	11,152.25	.1169
Plant arbitrary	95,363	15,738.24	.1650
Division expense	95,363	2,451.11	.0257
Total division cost	95,363	70,159.09	.7357
Preparing foundation:			
Drilling	5,313	2,276.93	.4286
Blasting	5,313	760.12	.1431
Excavation	5,313	7,766.63	1.4618
Tracks	5,313	1,490.28	.2805
Transportation	5,313	1,334.64	.2512
Drainage and pumps	5,313	1,723.09	.3243
Grouting under pressure	5,313	1,115.64	.2100
Maintenance of equipment	5,313	752.22	.1416
Division expense	5,313	1,290.29	.2428
Total division cost	5,313	18,509.84	3.4839
Less spoil for other divisions	1,153	864.75	.7500
Net division cost		17,645.09	
Concrete masonry, mass:			
Cement	11,232	15,369.63	1.3684
Sand	11,232	262.69	.0234
Stone	11,232	10,164.21	.9049
Mixing	11,232	4,947.36	.4405
Forms	11,232	8,626.88	.7681
Placing	11,232	3,370.73	.3001
Maintenance of equipment	11,232	1,691.76	.1506
Plant arbitrary	11,232	1,435.98	.1278
Division expense	11,232	1,816.02	.1617
Total division cost	11,232	47,685.26	4.2455
Concrete masonry, reinforced:			
Cement	602	1,317.07	2.1878
Sand	602	6.47	.0107
Stone	602	806.63	1.3399
Mixing	602	136.52	.2268
Forms	602	1,274.73	2.1175
Placing	602	117.61	.1954
Reinforcements	602	899.22	1.4937
Maintenance of equipment	602	243.84	.4050
Plant arbitrary	602	78.26	.1300
Division expense	602	273.39	.4542
Total division cost	602	5,153.74	8.5610
Miscellaneous:			
Structural steel framing		70.85	
Crane tracks, steel		49.69	
Anchoring concrete to rock, including drilling		4,035.90	
Fixed iron and steel		592.11	
Piping and valves		5.02	
Maintenance of equipment		.94	
Division expense		280.63	
Total division cost		5,035.14	
Total division cost entrance pier		152,534.57	

TABLE NO. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd.

	Quantities.	Amount.	Unit cost.
COALING PLANT.			
Preliminary and general work:	*Cubic yards.*		
Designing		$9,854.13	
Surveys		4,254.29	
Boring and test pits		1,064.65	
Clearing		82.25	
Inspection in the United States		15,935.80	
Division expense		2,535.12	
Total division cost		33,726.24	
Coal-storage area:			
Dry excavation—			
Clearing	188,078	4,076.52	$0.0217
Drilling	188,078	24,527.90	.1305
Blasting	188,078	9,561.52	.0508
Excavation by power	188,078	15,330.20	.0815
Excavation by hand	188,078	2,708.09	.0144
Tracks	188,078	15,279.67	.0812
Transportation	188,078	17,445.86	.0928
Dumps	188,078	1,186.25	.0063
Pumps	188,078	6,116.14	.0325
Maintenance of equipment	188,078	18,027.68	.0958
Plant arbitrary	188,078	25,982.88	.1382
Division expense	188,078	3,974.47	.0211
Total division cost	188,078	144,217.18	.7668
Preparing foundations—			
Excavation	1,256	3,560.78	2.8350
Pumps	1,256	13.58	.0108
Construction tracks	1,256	2,837.17	2.2589
Maintenance of equipment	1,256	363.61	.2895
Division expense	1,256	672.69	.5356
Total division cost	1,256	7,447.83	5.9298
Concrete masonry—			
Cement	8,185	9,109.01	1.1129
Stone	8,185	5,012.58	.6124
Sand	8,185	1,680.17	.2053
Mixing	8,185	3,136.75	.3832
Forms	8,185	8,333.23	1.0181
Placing	8,185	9,176.94	1.1212
Reinforcements in place	8,185	2,903.08	.3547
Pumps	8,185	88.22	.0108
Ladders and fittings	8,185	199.33	.0243
Maintenance of equipment	8,185	480.72	.0587
Plant arbitrary	8,185	818.43	.1000
Division expense	8,185	2,729.90	.3336
Total division cost	8,185	43,668.36	5.3352
Backfilling—			
Filling and grading	62,195	20,372.37	.3276
Plant arbitrary	62,195	108.96	.0017
Division expense	62,195	1,133.48	.0182
Total division cost	62,195	21,614.81	.3475
Grading floor—			
Grading		1,665.27	
Cleaning up		817.37	
Drainage		2,870.03	
Division expense		529.28	
Total division cost		5,881.95	
Foundations for stocking and reclaiming cranes—			
Excavation	1,032	4,444.06	4.3068
Concrete	4,839	37,440.01	7.7373
Reinforcements ....pounds	128,820	1,913.40	.0149
Drilling		80.31	
Blasting		249.75	
Fixed iron		875.61	
Tracks, permanent		14,813.41	
Backfilling	98	54.22	.5553
Pile foundations		2,425.91	
Maintenance of equipment		482.98	

TABLE NO. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd.

	Quantities.	Amount.	Unit cost.
COALING PLANT—continued.			
Coal-storage area—Continued.			
Foundations for stocking and reclaiming cranes—Continued.	*Cubic yards.*		
Plant arbitrary		$786.57	
Division expense		3,502.16	
Total division cost		67,068.69	
Total division cost, coal-storage area		289,898.82	
Coal-handling plant:			
Erection of stocking and reclaiming cranes—			
Berm cranes		38,277.00	
Steel erection ... tons	1,097.80	26,199.22	$23.8652
Alterations		25,649.00	
Machinery installation and housing		8,431.56	
Electrical installation		5,865.91	
Maintenance of equipment		1,054.69	
Division expense		4,175.20	
Total division cost		109,652.58	
Unloader towers—			
Contract payments		28,988.00	
Other erection expenses		629.34	
Division expenses		30.06	
Total division cost		29,647.40	
Conveyor system, erection expenses		10.72	
Total division cost, coal-handling plant		139,310.70	
SEA WALL AND UNLOADER WHARF.			
Preliminary and general work:			
Designing		1,660.08	
Surveys		2,292.22	
Boring and test pits		532.32	
Division expense		509.62	
Total division cost		4,994.24	
Dry excavation:			
Drilling	72,671	11,191.02	.1540
Blasting	72,671	5,423.77	.0746
Excavation by power	72,671	10,491.19	.1444
Excavation by hand	72,671	2,271.94	.0313
Tracks	72,671	10,266.93	.1412
Transportation	72,671	10,623.99	.1462
Drainage and pumps	72,671	3,392.98	.0467
Incline and cofferdam changes	72,671	8,557.20	.1178
Maintenance of equipment	72,671	8,634.39	.1188
Plant arbitrary	72,671	10,697.98	.1472
Division expense	72,671	2,862.13	.0394
Total division cost	72,671	84,413.52	1.1616
Less spoil for other divisions	800	600.00	.7500
Net division cost		83,813.52	
Preparing foundation:			
Drilling	3,360	84.22	.0251
Blasting	3,360	12.72	.0038
Excavation	3,360	5,460.63	1.6250
Tracks	3,360	137.08	.0408
Transportation	3,360	717.29	.2135
Drainage and pumps	3,360	987.15	.2938
Maintenance of equipment	3,360	605.86	.1803
Division expense	3,360	776.03	.2310
Total division cost	3,360	8,780.98	2.6133
Less spoil for other divisions	1,006	754.50	.7500
Net division cost		8,026.48	
Substructure, steel cylinders:			
Steel cylinders in place		593.28	
Excavation in cylinders	55	107.36	1.9520
Pumping		12.40	
Reinforcement in cylinders		21.32	
Division expense		12.82	
Total division cost		747.18	

TABLE No. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd.

	Quantities.	Amount.	Unit cost.
SEA WALL AND UNLOADER WHARF—continued.			
Concrete masonry, mass:	*Cubic yards.*		
Cement	14,673	$25,124.71	$1.7123
Sand	14,673	181.92	.0124
Stone	14,673	11,829.86	.8062
Mixing	14,673	5,967.73	.4067
Forms	14,673	14,152.21	.9646
Placing	14,673	5,980.21	.4076
Reinforcements	14,673	1,133.97	.0773
Maintenance of equipment	14,673	1,117.92	.0762
Plant arbitrary	14,673	2,103.15	.1433
Division expense	14,673	2,662.28	.1814
Total division cost	14,673	70,253.96	4.7880
Concrete masonry, reinforced:			
Cement	1,331	2,729.11	2.0504
Sand	1,331	240.49	.1807
Stone	1,331	1,406.27	1.0566
Mixing	1,331	530.11	.3983
Forms	1,331	5,092.45	3.8260
Placing	1,331	560.86	.4214
Reinforcements	1,331	2,992.68	2.2484
Maintenance of equipment	1,331	342.17	.2571
Plant arbitrary	1,331	173.03	.1300
Division expense	1,331	814.11	.6116
Total division cost	1,331	14,881.28	11.1805
Miscellaneous:			
Structural steel ... tons	530.57	33,356.45	62.8703
Concrete covering beams and girders	2,327	15,219.57	6.5404
Tracks and fastenings		5,885.92	
Bollards and cleats		184.57	
Anchors and deadmen		3,423.48	
Riprap		.41	
Piping		166.44	
Back fill	10,896	7,273.47	.6675
Ladders and fittings		199.33	
Maintenance of equipment		649.59	
Plant arbitrary		302.51	
Division expense		1,853.47	
Total division cost		68,515.21	
Total division cost, sea wall and unloader wharf		251,231.87	
RELOADER WHARF.			
Preliminary and general work:			
Designs		3,047.71	
Surveys		1,835.23	
Testing material		15.61	
Dredging under quay		5,104.87	
Construction tracks		2,299.65	
Construction trestles and pile supports		27,000.77	
Division expense		1,806.49	
Total division cost		41,110.33	
Substructure:			
Cylinders—			
Steel cylinders in place ... linear feet	4,320	53,502.52	12.3848
Excavation inside of cylinders	4,975	7,446.97	1.4969
Pumping		2,897.88	
Maintenance of equipment		5,291.69	
Total		69,139.06	
Concrete filling for cylinders	200	714.48	3.5724
Reinforcements in cylinders	200	1,206.11	6.0305
Pumping	200	124.02	.6201
Maintenance of equipment	200	190.20	.9510
Plant arbitrary	200	26.00	.1300
Total	200	2,260.81	11.3040
Division expense		2,123.12	
Total division cost		73,522.99	

TABLE No. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd.

	Quantities.	Amount.	Unit cost.
RELOADER WHARF—continued.	*Cubic yards.*		
Miscellaneous:			
Tracks and fastenings		$2,571.58	
Anchors		1,286.19	
Piping and valves		265.90	
Maintenance of equipment		39.15	
Division expense		73.06	
Total division cost		4,235.88	
Total division cost, reloader wharf		118,869.20	
Total division cost, coaling station		833,036.83	
PERMANENT SHOPS.			
Miscellaneous, general		508,031.66	
Steel erection		34,508.77	
Machine and erection shop		619,710.09	
Forge shop		215,190.56	
Steel storage shed		114,446.73	
Boiler and shipfitters' shop		228,543.40	
General storehouse		283,859.51	
Paint shop		55,656.73	
Car shop		93,538.87	
Planing mill		176,586.34	
Galvanizing building		54,297.45	
Lumber and equipment shed		113,259.84	
Pattern storage room		57,983.65	
Foundry		252,209.56	
Coke shed		10,208.63	
Boiler house		23,482.48	
Roundhouse		150,633.88	
Gas house		9,845.87	
Toilets		74,790.02	
Paint house		10,848.33	
Main office		165,135.17	
Sand house		12,395.81	
Compressor plant and pump house		51,236.15	
Lye house		2,592.65	
Shop tunnel		145,939.24	
Total division cost		3,464,922.39	
DOCKS.			
Quay wall, north of concrete dock:			
Preliminary work		11,169.52	
Substructure		182,003.43	
Superstructure		210,522.36	
Miscellaneous		33,026.68	
Total division cost		436,721.99	
Quay wall, south of concrete dock:			
Preliminary work		30,831.76	
Dredging		12,059.60	
Substructure		167,171.51	
Superstructure		118,365.02	
Miscellaneous		31,467.72	
Total division cost		359,895.61	
Bulkhead quay wall, between wharf and Pier No. 1:			
Preliminary work		9,025.56	
Substructure		69,724.92	
Superstructure		58,160.49	
Miscellaneous		26,820.43	
Total division cost		163,731.40	
Pier No. 1:			
Preliminary work		28,921.32	
Substructure		319,828.13	
Superstructure		257,123.05	
Miscellaneous		39,245.15	
Total division cost		645,117.65	
Total division cost, all docks		1,605,466.65	

TABLE NO. 19.—*Detailed cost, terminal facilities, Balboa, to June 30, 1915*—Contd

	Quantities.	Amount.	Unit cost.
FUEL-OIL-HANDLING PLANT.			
Storage:			
United States tanks Nos. 3 and 4—	*Cubic yards.*		
Surveys		$191.61	
Tracks		53.15	
Tank foundations		2,422.71	
Contract price		31,330.14	
Concrete gutters and aprons		2,212.36	
Fire walls		6,836.72	
Painting		1,933.10	
Miscellaneous pipe-line connections		1,093.64	
Miscellaneous charges		137.64	
Design and supervision		617.93	
Total division cost		46,832.00	
Tank farm—			
Surveys		759.91	
Water mains		1,585.57	
Drainage		1,799.80	
Design and supervision		737.22	
Total division cost		4,873.50	
Oil-pump plant:			
Boiler and pump house—			
General		1,225.49	
Design and supervision		2,707.68	
Structure		9,150.49	
Concrete drain sewers		1,255.67	
Machinery foundations		1,514.06	
Cost of equipment		17,846.78	
Brick setting		3,555.24	
Installation, boiler and stack		2,087.69	
Installation, auxiliary apparatus		6,226.13	
Installation, steam and water fittings		1,692.06	
Installation, oil pumps		1,744.03	
Electrical installation		1,434.96	
Manifold—			
Foundations		3,370.10	
Installation		15,433.94	
Valve indicators		82.59	
Total division cost		69,326.91	
Oil docks:			
Design and supervision		898.76	
Preliminary and general work		6,951.05	
Substructure		26,456.79	
Superstructure		7,872.54	
Miscellaneous		682.37	
Oil-boat anchorage		14,242.16	
Total division cost		57,103.67	
Pipe lines:			
Installation, 6-inch line, crib to pumping plant		1,146.32	
Installation, 10-inch line, crib to pumping plant		2,563.45	
Installation, 12-inch lines		8,115.31	
Installation, pipe line to Paraiso		43,662.64	
Total division cost		55,487.75	
Dredging berth for ships: Dredging		7,933.40	
Total division cost, oil fuel storage		211,557.23	
Gasoline storage:			
Tank foundation		11.21	
Tanks		21.51	
Design and supervision		46.82	
Total division cost, gasoline storage		79.60	
Total division cost, oil, fuel and gasoline storage		211,636.83	
Total division cost, Balboa terminal facilities		10,539,935.69	

NOTE.—This statement does not include the cost of the Panama Railroad concrete dock, $389,314.69, and the balance of construction plant and equipment, $109,558.23, to be absorbed in the various units of construction as the work progresses.

Table No. 20.—*Detailed cost, permanent townsites, to June 30, 1915.*

Item.	La Boca.	Balboa.	Pedro Miguel.	Gatun.	Cristobal.
Preliminary and general work	$37,557.50	$167,116.03	$32,688.82		
Preliminary maintenance		7,336.33			
Road construction	31,869.40	221,594.49	20,777.72		
Drainage	14,713.53	6,804.68	21,921.13		
Waterworks	20,779.72	36,404.94	19,597.24		
Sewer system	26,328.15	152,252.18	11,572.72		
Walks	6,084.34	28,430.31	281.62		
Balboa nursery		1,576.79			
Lot improvement		128,918.39		$3.75	
Street lighting		23,668.32	4,226.23	3,515.86	$4,076.44
Underground duct system		123,324.56	3,267.45	10,174.46	48,985.86
Improvements, block A	10,221.73				
Division expense	4,432.26	30,251.66	2,339.89		
Total division cost	151,986.63	927,678.68	116,672.82	13,694.07	53,062.30

Table No. 21.—*Detail of "Buildings" to June 30, 1915.*

		Amount.
Designing and preliminary expenses, new buildings		$18,778.45
Administration building, Balboa Heights		923,294.49
Administration building, Santa Rosa, appraisal of old building		100,000.00
Paraiso shops, appraisal of old building		2,800.00
Storehouses:		
Oil storehouse	$30,339.24	
Forage storehouse	4,652.64	
Appraisal of old buildings	87,797.07	
		122,788.95
Hotels and mess halls:		
La Boca mess hall	7,386.39	
La Boca kitchen	2,696.67	
Hotel Aspinwall landing stage	201.85	
Appraisal of old buildings	246,943.00	
		257,137.91
Gold quarters:		
Four-family concrete	914,300.15	
Two-family concrete	171,449.93	
Reerected wooden quarters	224,269.91	
New wooden quarters	34,315.08	
Appraisal of old buildings	1,375,978.89	
		2,720,313.96
Silver quarters:		
Reerected wooden quarters	193,004.71	
Appraisal of old buildings	148,987.97	
		341,992.68
Colon hospital		10,963.78
Dispensaries:		
Balboa dispensary	16,254.28	
Appraisal of Pedro Miguel dispensary	300.00	
		16,554.28
Asylums:		
Corozal asylum buildings	61,767.84	
Dairy shed	23,538.81	
Dairy building	12,539.89	
Hog shed	8,232.22	
		106,078.76
Quarantine stations:		
Balboa quarantine station	35,731.40	
Balboa quarantine landing	13,189.84	
		48,921.24
Medical storehouse, Ancon		22,259.62
Post offices:		
Corozal	1,592.62	
Appraisal of old buildings	34,390.00	
		35,982.62
School houses, appraisal of old buildings		69,515.00
Courthouses, fire and police stations, jails, etc.:		
La Boca fire station	280.22	
Balboa fire station	18,209.87	
Balboa police station	11,190.59	
Appraisal of old buildings	60,635.44	
		90,316.12
Fluviographs		11,479.38

TABLE No. 21.—*Detail of "Buildings" to June 30, 1915*—Continued.

		Amount.
Miscellaneous buildings:		
Balboa clubhouse	$17,481.20	
Pedro Miguel clubhouse	19,695.77	
La Boca clubhouse	3,989.62	
Balboa motor-car house	11,256.52	
Balboa garage	2,889.96	
Ancon garage	1,623.46	
Office and storeroom, Ancon	1,035.04	
Office, store, and shop, district quartermaster, Balboa Heights	14,170.52	
Anemometer tower, Balboa Heights	1,747.69	
Boathouse, marine division, Piers 1-2, Colon	1,565.92	
Five small buildings	845.17	
Appraisal of old buildings	114,367.26	
		$190,668.13
Total buildings		5,089,845.37

TABLE No. 22.—*Detailed cost, new Panama water system to June 30, 1915.*

	Quantities.	Amount.	Unit cost.
Preliminary investigations, surveys and borings prior to June 30, 1913	*Cubic yards.*	$4,130.08	
Pipe lines south of Miraflores:			
30-inch pipe line ... linear feet	21,000	145,698.64	$6.9380
20-inch pipe line ... do	21,000	82,421.33	3.9248
16-inch pipe line ... do	21,000	65,031.17	3.0967
Division expense		4,030.07	
Total division cost		297,181.21	
Pipe lines, Gamboa to Miraflores:			
36-inch pipe line ... linear feet	18,790	119,983.59	6.3855
30-inch pipe line ... do	38,972	224,401.50	5.7580
24-inch pipe line ... do	2,000	10,639.72	5.3199
Division expense		1,926.29	
Total division cost		356,951.10	
Addition to high service reservoir, Ancon:			
Preparatory work		7,700.24	
Excavation		7,865.48	
Cleaning up and dismantling plant		2,329.03	
Temporary structures		156.97	
Concrete		44,524.90	
Backfill		434.50	
Machinery and piping		1,784.63	
Tools and equipment		2,671.23	
Division expense		1,962.75	
Total division cost		69,429.73	
Appraised value of old high service reservoir, Ancon		60,000.00	
Appraised value of old low service reservoir, Ancon		40,000.00	
UNITED STATES PUMP STATION NO. 1, GAMBOA, CANAL ZONE.			
Preliminary work:			
Surveys		156.03	
Tracks		1,049.72	
Grading and filling		209.04	
Designing		21.25	
Excavation for foundations	2,403	4,033.07	1.6783
Foundations, driving piles		1,128.98	
Temporary structures		452.29	
Total division cost		7,050.38	
Concrete foundations		8,019.56	
Concrete superstructure		7,733.52	
Roofing		2,928.38	
Machinery and fittings		28,067.80	
Woodwork		1,967.42	
Plumbing		243.73	
Electric lights and wiring		1,742.60	
Painting		410.16	
Pavements		1,328.11	
Backfilling and cleaning up		842.05	
Division expense		1,220.06	
Total division cost		61,553.80	

TABLE NO. 22.—*Detailed cost, new Panama water system to June 30, 1915*—Continued.

	Quantities.	Amount.	Unit cost.
UNITED STATES PUMP STATION NO. 2, MIRAFLORES, CANAL ZONE.			
Preliminary work:	*Cubic yards.*		
Tracks		$42.96	
Grading and filling		325.04	
Excavation for foundations		363.05	
Temporary structures		84.43	
Total division cost		815.48	
Concrete foundations		2,366.85	
Concrete superstructure		6,306.58	
Roofing		2,807.95	
Machinery and fittings		22,785.75	
Woodwork		1,526.79	
Plumbing		29.02	
Electric lights and wiring		986.78	
Painting		565.44	
Backfilling and cleaning up		17.47	
Pavements		1,025.51	
Division expense		840.61	
Total division cost		40,074.23	
UNITED STATES PUMP STATION NO. 3, BALBOA, CANAL ZONE.			
Preliminary work:			
Tracks		622.01	
Grading and filling		134.51	
Excavation for foundations	5,172	9,728.49	$1.8810
Foundations, driving piles	1,900	759.12	.3995
Temporary structures		116.85	
Total division cost		11,360.98	
Concrete foundations		6,281.48	
Concrete superstructures		6,975.80	
Roofing		4,291.15	
Machinery and fittings		30,893.81	
Woodwork		1,511.81	
Plumbing		171.95	
Electric lights and wiring		1,604.16	
Backfilling and cleaning up		68.64	
Pavements		1,442.89	
Painting		144.16	
Division expense		1,660.00	
Total division cost		66,406.83	
Pump station, Miraflores, abandoned		32,619.36	
MIRAFLORES FILTRATION PLANT.			
Hypochlorite injection chamber.			
Preliminary work:			
Designing filtration plants		102.44	
Excavation by hand	201	416.52	2.0722
Total		518.96	
Concrete foundation and superstructure (including floors)		4,042.74	
Concrete tiles		40.87	
Electric lights and wiring		36.52	
Machinery and fittings:			
Material		4,720.46	
Installation		267.62	
Total		4,988.08	
Paving		508.81	
Division expense		341.86	
Total division cost		10,477.84	
Purification plant.			
Preliminary work:			
Designing filtration plants		369.32	
Tracks		10,776.05	
Grading and filling		12,744.96	
Excavation by steam shovel	61,137	20,116.96	.3290
Excavation by hand	30,275	30,404.74	1.0042
Driving piles	3,416	3,478.77	1.0184
Temporary structures		1,463.98	
Total division cost		79,354.78	

TABLE No. 22.—*Detailed cost, new Panama water system to June 30, 1915*—Continued.

	Quantities.	Amount.	Unit cost.
MIRAFLORES FILTRATION PLANT—continued.			
Purification plant—Continued.	*Cubic yards.*		
Concrete foundations	....	$31,382.42	....
Concrete superstructure (including floors)	....	184,446.34	....
Floor tile	....	1,074.80	....
Concrete wash water tank	....	12,364.58	....
Steel beams in place	....	7,371.84	....
Concrete tiles	....	26,159.31	....
Woodwork	....	16,215.86	....
Metal work	....	74.40	....
Plumbing	....	2,398.89	....
Electric lights and wiring	....	12,330.10	....
Painting	....	2,047.70	....
Machinery and fittings:			
Material	....	92,249.65	....
Installation	....	23,616.85	....
Total division cost	....	115,866.50	....
Filters and sedimentation basins: Gravel and sand	....	8,735.61	....
Backfilling and cleaning up	....	8,123.75	....
Pavements and sodding grounds	....	14,014.87	....
Laboratory and office equipment	....	3,140.25	....
Tools and equipment	....	8,836.66	....
Division expense	....	13,751.91	....
Total division cost	....	547,690.57	....
Total division cost, new Panama water system	....	1,586,514.75	....

TABLE No. 23.—*Statement of profit and loss on business operations for fiscal year ending June 30, 1915.*

	Cost.	Revenues.	Profit (+) or loss (−).
1. Construction and repairs	$197,367.33	$187,900.45	−$9,466.88
2. Shop work	77,272.21	87,020.42	+ 9,748.21
3. Electrical-division work	4,027.82	4,355.56	+ 327.74
4. Electric current	27,949.89	48,999.26	+21,049.37
5. Compressed air	1,965.83	1,929.58	− 36.25
6. Train service and use of rolling equipment	1,371.46	1,551.64	+ 180.18
7. Towage	22,556.70	19,866.89	− 2,689.81
8. Other uses of floating equipment	3,435.88	5,133.39	+ 1,697.51
9. Pilotage	16,505.81	35,000.38	+18,494.57
10. Wharfage	....	3,513.79	+ 3,513.79
11. Sales of water	7,828.76	19,903.08	+12,074.32
12. Operation and maintenance of Panama waterworks and sewers	40,546.86	40,546.86	....
13. Repairs and maintenance of Panama pavements	16,848.42	16,848.42	....
14. Operation and maintenance of Colon waterworks and sewers	29,721.17	29,721.17	....
15. Repairs and maintenance of Colon pavements	10,209.10	10,209.10	....
16. Proportion of repairs and maintenance, Panama water-supply system	31,019.40	31,019.40	....
17. Proportion of repairs and maintenance, Colon water-supply system	24,195.28	24,195.28	....
21. Handling lines	13,655.84	9,864.00	− 3,791.84
31. Hotel Tivoli	171,050.18	143,646.71	−27,403.47
32. Hotel Aspinwall	28,894.29	22,818.46	− 6,075.83
33. Line hotels	610,281.82	515,851.82	−94,430.00
34. Messes	208,079.88	195,259.56	−12,820.32
35. Subsistence, miscellaneous	....	211.12	+ 211.12
36. Material from stock	174,014.49	188,409.92	+14,395.43
37. Rock, sand, gravel, and screenings	1,841.61	3,576.64	+ 1,735.03
38. Rental of gold quarters	72,898.77	59,209.63	−13,689.14
39. Rental of silver quarters	18,025.02	56,220.16	+38,195.14
40. Printing and binding	3,887.65	3,556.93	− 330.72
43. Corral services	10,694.43	11,866.87	+ 1,172.44
44. Miscellaneous jobs	18,316.50	18,902.12	+ 585.62
45. Sanitation of Canal Zone	9,712.43	9,002.12	− 710.31
51. Lost metal checks	89.41	3,107.80	+ 3,018.39
ANCON HOSPITAL.			
55. Fees	187,953.04	183,021.51	− 4,931.53
56. Mess	9,300.72	8,850.88	− 449.84
57. Burial	3,086.65	2,942.82	− 143.83
58. Miscellaneous	3,156.95	3,192.47	+ 35.52

TABLE No. 23.—*Statement of profit and loss on business operations for fiscal year ending June 30, 1915*—Continued.

	Cost.	Revenues.	Profit (+) or loss (−).
COLON HOSPITAL.			
59. Fees	$10,179.21	$9,265.92	− $913.29
60. Mess	749.99	773.67	+ 23.68
61. Miscellaneous	164.66	144.20	− 20.46
62. Palo Seco leper asylum	12,871.04	9,147.49	− 3,723.55
63. Line dispensaries	1,572.57	1,572.57	....
QUARANTINE.			
64. Subsistence	21,861.30	15,314.43	− 6,546.87
65. Transportation	622.83	622.83	....
66. Other charges	975.73	1,246.10	+ 270.37
HEALTH OFFICE, PANAMA.			
67. Cleaning premises	416.68	416.68	....
68. Sale of garbage cans, etc	5,184.93	5,184.93	....
69. Street cleaning, Republic of Panama	37,999.96	37,999.95	− .01
HEALTH OFFICE, COLON.			
70. Cleaning premises	1,457.51	1,457.51	....
71. Sale of garbage cans, etc	1,606.59	1,606.59	....
72. Street cleaning, Republic of Panama	12,639.79	13,306.94	+ 667.15
73. Dump sales	273.39	273.39	....
74. Sale of flowers, plants, and fruits	237.42	237.42	....
75. Burials	1,350.00	1,350.00	....
ZONE SANITATION.			
76. Cleaning premises, sale of larvacide, etc	31.33	173.87	+ 205.20
77. Burials	435.25	385.25	− 50.00
COROZAL FARM.			
78. Produce	3,465.76	3,081.24	− 384.52
79. Pasturage	191.50	228.10	+ 36.60
80. Burials	106.40	106.40	....
81. Sales from medical store	1,615.28	828.02	− 787.26
82. Insane asylum	9,404.56	12,402.00	+ 2,997.44
85. Photographs and prints	353.32	1,235.13	+ 881.81
86. Cablegrams	494.34	1,480.95	+ 986.61
87. Police service	4,354.16	4,641.06	+ 286.90
88. Miscellaneous	3,161.26	3,366.07	+ 204.81
Total	2,191,475.70	2,135,074.92	−56,400.78

TABLE No. 24.—*Statement of receipts and disbursements from appropriations for fiscal year ending June 30, 1915.*

	Cash balance July 1, 1914.	Acts of Aug. 1, 1914 and Mar. 3, 1915.	Collections repaid appropriations during fiscal year.	Transfers between Panama Canal appropriations on charges rendered between departments.	Total available during the year.	Disbursements.	Transfer to Panama Canal fund and Panama fortifications.	Cash balance June 30, 1915.
In the United States:								
Salaries	$5,086.88	$150,000.00	$694.11		$155,780.99	$76,498.64	$79,282.35	
Incidentals	13,091.50	62,000.00	823.39	$252.17	76,167.06	39,837.60	36,329.46	
Construction and engineering:								
Officers and employees	207,298.32	2,414,000.00	248,037.33	16,100.95	2,885,436.60	1,749,923.09	1,135,513.51	
Skilled and unskilled labor	514,678.00	7,000,000.00	763,091.46	59,768.87	8,337,538.33	5,132,602.15	3,204,936.18	
Material and supplies	3,651,466.06	9,000,000.00	1,797,424.34	250,076.80	14,698,967.20	8,085,550.01	6,613,417.19	
Incidental expenses	33,335.87	725,000.00	34,117.69	13,463.50	805,917.06	382,014.54	423,902.52	
Civil administration:								
Officers and employees	79,171.96	500,000.00	35,236.89	[1] 7,913.64	606,495.21	271,170.49	335,324.72	
Skilled and unskilled labor	19,253.79		44,093.25	[1] 11,174.46	52,172.58	20,506.04	31,666.54	
Material and expenses	94,123.98	72,000.00	29,890.61	[1] 36,497.29	159,517.30	12,450.65	147,066.65	
Sanitation:								
Officers and employees	33,743.06	300,000.00	40,018.92	244.31	374,006.29	267,077.65	106,928.64	
Skilled and unskilled labor	55,573.29	120,000.00	19,349.40	416.65	195,339.34	82,001.13	113,338.21	
Material and expenses	297,379.61	375,000.00	64,369.61	[1] 42,321.33	694,427.89	117,794.04	576,633.85	
Relocation of Panama Railroad	396,570.28		28.00		396,598.28	3,476.95	393,121.33	
Sanitation in cities of Panama and Colon	74,556.86				74,556.86		74,556.86	
Canal connecting Atlantic and Pacific Oceans	1,113,220.88			[1] 12,609.48	1,100,611.40	295,618.41		$804,992.99
Construction and equipment		10,500,000.00			10,500,000.00			10,500,000.00
Maintenance and operation		5,200,000.00			5,200,000.00			5,200,000.00
Sanitation, Canal Zone		700,000.00			700,000.00			700,000.00
Civil government, Panama Canal and Canal Zone		540,000.00			540,000.00			540,000.00
Panama Canal fund			3,209,666.00	1,460,739.75	4,670,405.75	13,087,397.80	[2] 13,272,018.01	4,855,025.96
Total	6,588,550.34	37,658,000.00	6,286,841.00	1,690,546.80	52,223,938.14	29,623,919.19		22,600,018.95
Armament of fortifications	1,060,635.08	259,000.00		[1] 903.62	1,318,731.46	745,867.63	572,863.83	
Causeway or bridge connecting fortifications	92,657.37			[1] 7,356.38	85,300.99		85,300.99	
Field fortifications and camps	290,740.59			[1] 92,841.38	197,899.21	56.18	197,843.03	
Fire control at fortifications	194,131.85	50,000.00		[1] 4,971.29	239,160.56	36,726.22	202,434.34	
Electric light and power plants	165,836.61	33,550.00		[1] 15,260.01	184,126.60	37,627.76	146,498.84	
Land for military purposes	50,000.00				50,000.00		50,000.00	
Sanitary clearing, filling, etc	210,000.00				210,000.00		210,000.00	
Seacoast batteries	2,160,950.26			[1] 347,619.07	1,813,331.19	573,860.17	1,239,471.02	
Searchlights for seacoast fortifications	285,000.00			[1] 61.65	284,938.35		284,938.35	
Submarine mines	51,278.24	2,700.00		[1] 371.83	53,606.41	37,435.37	16,171.04	
Submarine mine structures	187,616.53			[1] 107,438.29	80,178.24		80,178.24	

Surveys for military purposes	20,088.31			[1] 4,274.62	15,813.69		15,813.69	
Army quarters, storehouses, etc		700,000.00			700,000.00	80,645.90	619,354.10	
Buildings and material		57,375.00			57,375.00		57,375.00	
Maintenance of clearings and trails		21,900.00			21,900.00	7.50	21,892.50	
Panama fortifications				[1] 1,109,448.66	[2] 1,109,448.66	947,332.22	[2] 3,800,134.97	1,743,354.09
Armament of fortifications		763,000.00			763,000.00	122,259.55		640,740.45
Army quarters, storehouses, etc		1,290,000.00			1,290,000.00			1,290,000.00
Electric light and power plants		3,081.00			3,081.00			3,081.00
Fire control at fortifications		383,301.30			383,301.30	100,070.60		283,230.70
Maintenance of clearings and trails		45,000.00			45,000.00			45,000.00
Maintenance of searchlight and electric power equipment		7,500.00			7,500.00			7,500.00
Preservation and repair of fortifications		15,000.00			15,000.00			15,000.00
Reserve equipment for fortifications		50,000.00			50,000.00			50,000.00
Searchlights for seacoast fortifications		79,666.00			79,666.00			79,666.00
Submarine mines		2,500.00			2,500.00	238.39		2,261.61
Total	4,768,934.84	3,763,573.30		1,690,546.80	6,841,961.34	2,682,127.49		4,159,833.85
Annual payment to Republic of Panama, act of Jan. 25, 1915		250,000.00			250,000.00	250,000.00		
Presenting launch Louise to French Government, act of Aug. 25, 1914		6,000.00			6,000.00			6,000.00
Private acts	3,500.00				3,500.00	2,000.00		1,500.00
Acts of July 17, 1914, Feb. 27 and Mar. 3, 1915		5,510.99			5,510.99	5,510.99		
Judgment, Court of Claims, war, act of July 29, 1914		905.38			905.38	905.38		
Judgment, United States Court, act of Apr. 6, 1914		9,489.76			9,489.76	9,489.76		
Total	3,500.00	271,906.13			275,406.13	267,906.13		7,500.00
Grand total	11,360,985.18	41,693,479.43	6,286,841.00		59,341,305.61	32,573,952.81		26,767,352.80

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[1] Charges against appropriations.

[2] Credit to appropriations.

TABLE NO. 25.—*Payments made by fiscal officers, fiscal year 1914–15.*

PAYMASTER.

Month.	Panama Canal payments.				Panama Railroad payments.			Grand total.
	Gold rolls.	Silver rolls.	Vouchers.	Total.	Pay rolls.	Vouchers.	Total.	
1914.								
July	$1,498,560.33	$684,857.69	$567,746.11	$2,751,164.13				$2,751,164.13
August	604,549.33	669,217.51	542,054.86	1,815,821.70				1,815,821.70
September	597,321.84	632,722.00	514,445.86	1,744,489.70				1,744,489.70
October	570,061.74	599,817.67	591,811.79	1,761,691.20	$19,085.18	$293,899.81	$312,984.99	2,074,676.19
November	549,789.54	601,647.73	640,699.75	1,792,137.02	160,816.38	562,477.70	723,294.08	2,515,431.10
December	521,816.98	531,498.70	526,026.35	1,579,342.03	203,561.96	482,402.71	685,964.67	2,265,306.70
1915.								
January	488,987.76	537,610.19	598,293.04	1,624,890.99	215,845.94	648,212.49	864,058.43	2,488,949.42
February	478,064.94	517,717.75	586,863.77	1,582,646.46	222,789.03	551,195.55	773,984.58	2,356,631.04
March	485,577.50	477,654.99	553,770.78	1,517,003.27	211,424.31	484,361.30	695,785.61	2,212,788.88
April	515,761.28	517,307.90	575,149.43	1,608,218.61	232,943.29	317,558.97	550,502.26	2,158,720.87
May	470,654.62	515,594.77	483,697.06	1,469,946.45	203,531.07	531,468.52	734,999.59	2,204,946.04
June	478,286.99	524,793.17	584,870.20	1,587,950.36	232,322.83	429,926.98	662,249.81	2,250,200.17
Total	7,259,432.85	6,810,440.07	6,765,429.00	20,835,301.92	1,702,319.99	4,301,504.03	6,003,824.02	26,839,125.94

COLLECTOR.

Month.	Disbursing clerk.	Total.	Canal Zone revenues.	Clubhouse funds.	Trust funds.	Postal savings funds.	Money-order funds.
1914.							
July	$1,326,779.92	$458,928.81	$28,118.49	$11,375.53	$876.24	$67,148.00	$351,410.55
August	1,350,231.40	328,785.47	7,901.27	5,593.29	124.48	36,939.00	278,227.43
September	1,028,139.64	355,161.86	19,797.91	11,205.38	2,157.25	45,401.00	276,600.32
October	1,163,650.09	294,519.27	33,454.18	9,510.15	614.94	34,940.00	216,000.00
November	856,863.60	267,796.62	12,973.49	2,901.47	501.91	24,675.00	226,744.75
December	1,040,458.51	311,587.16	10,844.26	7,691.99	1,695.91	26,505.00	264,850.00
1915.							
January	1,215,442.94	327,083.07	20,562.56	7,459.20	1,703.46	20,035.00	277,322.85
February	984,295.81	482,063.13	69,268.63	9,186.17	100.00	9,225.00	394,283.33
March	857,928.18	290,994.18	26,054.83	7,889.33	658.04	23,785.00	232,606.98
April	728,397.38	286,365.96	19,188.12	7,500.15	745.69	24,507.00	234,425.00
May	1,148,376.38	310,619.45	16,666.20	7,838.96	1,085.54	23,715.00	261,313.75
June	797,936.57	259,017.58	41,592.83	5,091.81	1,120.91	10,970.00	200,242.03
Total	12,498,500.42	3,972,922.56	306,422.77	93,243.43	11,384.37	347,845.00	3,214,026.99

TABLE No. 26.—*Statement of collections repaid to appropriations and to individuals and companies and collections deposited to miscellaneous receipts during the fiscal year ending June 30, 1915.*

Department and classification.	Total, fiscal year 1915.
DEPARTMENT OF OPERATION AND MAINTENANCE.	
Construction and repairs	$681,750.36
Shop work	955,181.23
Electrical division work	89,843.41
Electric current	93,455.13
Compressed air	1,139.77
Train service and use of rolling equipment	27,113.79
Towage	78,681.76
Other use of floating equipment	9,563.06
Pilotage	33,448.00
Wharfage	2,746.42
Sales of water	35,772.16
Handling lines	10,736.00
Cable expense on deposits	1,474.54
Water rents (Panama and Colon)	175,619.82
Dredging	164,798.39
Hostling	110,834.03
Rental of commercial docks	15,591.00
Pay-roll errors	628.74
Boiler inspection	440.13
Meals on floating equipment	26,283.69
Minor supplies, services, and property furnished	52,470.79
Total department of operation and maintenance	2,567,572.22
SUPPLY DEPARTMENT.	
Subsistence:	
Hotel Tivoli	139,081.84
Hotel Aspinwall	22,458.31
Line hotels	109,009.58
Messes	9,227.49
Commissary coupons honored by Panama Canal	68,789.24
Hotel coupon books	298,615.12
Laborers' meal tickets	196,717.26
Minor supplies, services, and property furnished	8,748.03
Total subsistence	852,646.87
Quartermaster:	
Material from stock	1,382,381.94
Rock, sand, gravel, and screenings	10,732.84
Purchasing and handling supplies	39,359.68
Rental of quarters	113,399.00
Printing and binding	11,191.03
Corral service	54,905.46
Miscellaneous jobs	264,176.37
Sanitation of Canal Zone	9,095.20
Cost of making sales	99,192.20
Construction and operation of quarters	174,068.26
Corral and utility service (Panama R. R.)	256,440.16
Wharfage	2,100.00
Pay-roll errors	29.87
Proportion of salaries	1,540.06
Rental of equipment	281.88
Minor supplies, services, and property furnished	21,689.11
Total quartermaster	2,440,583.06
Total supply department	3,293,229.93
ACCOUNTING DEPARTMENT.	
Lost metal checks	2,445.60
Proportion of salaries	76,602.11
Overpayments, vouchers disallowed, suspensions, etc	7,300.14
ACCOUNTING DEPARTMENT—contd.	
Minor supplies, services, and property furnished	$1.50
Total accounting department	86,349.35
EXECUTIVE DEPARTMENT.	
Photographs and prints	1,235.53
Cablegrams	496.87
Proportion of salaries	63,572.52
Sales of charts	151.35
Motor-car service	668.23
Minor supplies, services and property furnished	70.44
Total executive department	66,194.94
CIVIL GOVERNMENT.	
Police service	28,700.90
Gamboa prison mess	91.25
Lost property	54.41
Pay-roll errors	28.00
Part reimbursement of postmasters' salaries	15,000.00
Minor supplies, services and property furnished	89.00
Total civil government	43,963.56
LAND OFFICE.	
Office expense (Panama Railroad)	13,954.63
Transcript fees (Joint Land Commission)	293.10
Total land office	14,247.73
HEALTH DEPARTMENT.	
Ancon Hospital:	
Fees	144,687.91
Mess	8,330.80
Burial expense	2,794.79
Analysis	112.34
Sales of live stock	1,536.00
Laundry	2,029.49
Telephone operators	941.34
Minor supplies, services and property furnished	588.74
Colon Hospital:	
Fees	6,709.14
Mess	685.65
Burial expense	108.75
Minor supplies, services and property furnished	13.50
Line dispensaries: Medical treatment	1,564.25
Palo Seco Leper Asylum: Treatment and supplies	1,953.66
Quarantine:	
Subsistence	15,049.29
Transportation	604.30
Guards	730.00
Fumigation	218.62
Health officer, Colon:	
Cleaning premises	1,936.71
Sales of garbage cans, stands, etc	1,513.66
Sales of flowers	513.36
Sales from dump	513.51
Street Cleaning (Republic of Panama)	2,068.01
Burial expense	1,142.90

TABLE NO. 26.—*Statement of collections repaid to appropriations and to individuals and companies and collections deposited to miscellaneous receipts during the fiscal year ending June 30, 1915*—Continued.

Department and classification.	Total, fiscal year 1915.
HEALTH DEPARTMENT—continued.	
Health officer, Panama:	
Cleaning premises	$416.98
Sales of garbage cans, stands, etc	4,862.43
Sales from dump	327.20
Street cleaning (Republic of Panama)	6,333.34
Zone sanitation:	
Burial expense	420.96
Sales of larvacide	66.47
Corozal farm:	
Produce	$5,124.73
Pasturage	256.60
Burial expense	48.02
Insane Asylum: Treatment	122.00
Medical storehouse: Sales of supplies	798.95
Minor supplies, services and property furnished	158.87
Total health department	215,283.27

RECAPITULATION.

Department and classification.		Total, fiscal year 1915.
Construction and engineering:		
Department of operation and maintenance		$2,567,572.22
Supply department:		
Subsistence	$852,646.87	
Quartermaster	2,440,583.06	
		3,293,229.93
Accounting department		86,349.35
Executive department		66,194.94
Total construction and engineering		6,013,346.44
Total civil government		43,963.56
Total land office		14,247.73
Total health department		215,283.27
Total repayment to appropriation		6,286,841.00
Collections for individuals and companies:		
Panama Railroad Co.: Sales and overissues of commissary books, sales of equipment, commissary supplies, coal, services rendered, etc		349,237.31
Collections for indviduals and companies—Continued.		
Various individuals and companies: For miscellaneous services, etc		$250.76
Total collections for individuals and companies		349,488.07
Miscellaneous receipts:		
Sales of construction material and equipment		223,896.86
Water rents (Panama and Colon)		78,312.27
Panama Canal tolls		4,357,998.37
Total miscellaneous receipts		4,660,207.50
Grand total		11,296,536.57

TABLE NO. 27.—*Statement of audited pay rolls on Isthmus during fiscal year 1915.*

Executive office		$332,561.10
Clerical, personnel, and general	$214,305.26	
Timekeeping	99,715.84	
Clubhouses	18,540.00	
Engineer of maintenance		99,552.23
Lock operation and erection		603,114.09
General construction		143,007.70
Terminal construction		1,446,828.88
Office	64,301.01	
Balboa terminals	1,008,474.99	
East breakwater	130,448.69	
Cristobal coaling plant	243,604.19	
Railroad transportation		346,550.84
Dredging		1,541,127.67
Municipal engineering		1,015,201.02
Electrical division		527,899.31
Mechanical division		2,097,010.47
Marine division		148,954.82
Building division		1,180,148.71
Supply department		1,113,668.35
Quartermaster	985,103.65	
Subsistence	128,564.70	

Accounting department		$348, 914. 77
Auditor	$280, 747. 35	
Paymaster	41, 638. 51	
Collector	26, 528. 91	
Civil government		397, 924. 14
Civil affairs	28, 361. 39	
Courts, district attorney, and marshal	28, 083. 91	
Special attorney, law and land	22, 798. 74	
Police and fire	243, 185. 19	
Posts	75, 494. 91	
Health department		520, 392. 38
Joint land commission		36, 817. 93
Fortifications (seacoast batteries, etc., Army quarters, storehouses, etc.)		875, 712. 10
Injury and death		116, 754. 49
Accrued leave and omitted time prior to Apr. 1, 1914		7, 072. 25
Total		12, 899, 213. 25

TABLE NO. 28.—*Statement of accounts receivable registered during the fiscal year ending June 30, 1915.*

Month.	Number of bills registered.	Total.	Against the Panama R. R.	Against the Canal Zone government.	Against the Republic of Panama	Against other departments of United States Government.	Against steamship companies.	Against other individuals and companies.	Trust funds.		For various collections; hospitals and messes.	Tolls.	Repay to appropriation.
									For pay-roll deductions.	Other collections.			
1914—July	638	$856,692.47	$483,376.88	$11,967.65	$10,641.35	$95,589.74	$9,694.44	$39,428.34	$191,922.43	$36.96	$6,436.28	$7,598.40	$647,994.85
August	588	705,378.57	311,843.85	16,911.09	11,451.10	51,334.22	11,485.39	15,892.18	192,454.51	2.60	5,601.83	88,401.80	421,378.34
September	542	947,550.82	395,364.90	19,372.92	8,662.21	30,685.33	13,320.12	15,434.25	192,412.11	1,021.75	5,676.40	265,600.80	509,311.83
October	651	994,439.69	311,168.82	10,292.42	8,767.32	28,005.56	8,219.13	68,348.99	181,414.37	6,717.98	4,718.62	366,786.48	432,493.25
November	619	1,091,647.99	456,460.50	6,847.68	8,694.00	30,993.06	3,571.91	32,589.34	172,496.55	6,607.49	4,226.18	369,161.28	539,823.54
December	733	1,142,352.44	393,810.78	8,716.31	14,897.48	26,518.35	8,469.68	60,563.52	212,321.97	5,506.75	3,632.80	407,914.80	535,650.25
1915—January	725	995,290.72	279,956.59	9,767.66	12,378.81	56,396.52	11,465.42	28,189.65	188,317.62	5,538.87	4,678.46	398,601.12	407,930.03
February	703	947,213.41	286,637.15	7,715.99	10,068.88	27,939.64	9,879.07	35,189.93	176,686.22	6,130.04	3,061.53	383,904.96	379,519.35
March	843	915,465.98	250,693.41	4,806.06	10,920.15	39,087.50	13,574.65	31,379.30	....	9,060.66	4,851.69	551,092.56	317,499.44
April	824	1,119,194.90	341,974.26	7,485.96	19,203.48	78,997.18	13,290.40	18,446.03	186,840.61	6,623.79	3,917.70	442,415.49	441,711.36
May	897	1,173,679.26	305,821.90	12,555.34	14,663.38	33,708.05	14,102.40	57,949.57	195,121.56	13,422.50	3,657.61	522,676.95	434,795.94
June	923	1,308,264.49	337,053.03	18,297.01	41,526.96	49,042.14	15,574.00	86,157.68	206,045.03	11,845.00	3,494.59	539,229.05	529,171.40
Total	8,686	12,197,170.74	4,154,162.07	134,736.09	171,875.15	548,297.29	132,646.61	489,568.78	2,096,032.98	72,514.39	53,953.69	4,343,383.69	5,597,279.58

NOTE.—Tolls earned from vessels owned by United States Government during the year, amounting to $80,872.79, not included in above statement.

TABLE NO. 29.—*Statement of collections made on pay rolls during the fiscal year ending June 30, 1915, for commissary and hotel coupon books and meal tickets.*

	Commissary.				Hotel.				Meal tickets.			Total values.
	Panama Canal rolls.	Canal Zone government rolls.	Panama R. R. Co. rolls.	Total.	Panama Canal rolls.	Canal Zone government rolls	Panama R. R. Co. rolls.	Total.	Panama Canal rolls.	Panama R. R. Co. rolls.	Total.	
1914—July	$191,180.01	$25.00	$54,807.50	$246,012.51	$28,962.85	....	$2,414.40	$31,377.25	$16,172.59	$5,881.58	$22,054.17	$299,443.93
August	191,768.75	45.00	52,482.50	244,296.25	28,329.65	$4.80	2,644.80	30,979.25	15,199.21	4,516.60	19,715.81	294,991.31
September	192,132.63	50.00	46,242.50	238,425.13	25,401.33	....	2,341.20	27,742.53	13,676.50	3,197.33	16,873.83	283,041.49
October	181,125.78	597.50	40,757.50	222,480.78	19,945.20	75.00	1,944.60	21,964.80	14,158.61	3,169.42	17,328.03	261,773.61
November	171,712.40	692.50	37,437.50	209,842.40	13,929.60	15.00	1,278.60	15,223.20	12,672.64	3,047.82	15,720.46	240,786.06
December	211,711.25	732.50	47,724.80	260,168.55	3,783.00	15.00	234.60	4,032.60	12,900.75	3,827.20	16,727.95	280,929.10
1915—January	187,594.00	537.50	43,662.50	231,794.00	2,208.60	....	150.00	2,358.60	11,135.23	4,469.96	15,605.19	249,757.79
February	176,336.46	550.00	40,685.00	217,571.46	1,220.40	....	99.60	1,320.00	9,283.24	3,966.99	13,250.23	232,141.69
March	186,460.90	487.50	43,189.53	230,137.93	859.20	....	30.00	889.20	9,232.05	4,921.49	14,153.54	245,180.67
April	194,690.85	557.50	40,675.00	235,923.35	329.40	....	....	329.40	8,811.99	5,218.02	14,030.01	250,282.76
May	205,525.37	562.50	47,482.50	253,570.37	14.40	....	....	14.40	8,666.70	5,882.07	14,548.77	268,133.54
June	213,329.35	465.00	49,163.20	262,957.55	67.20	....	....	67.20	7,036.11	5,814.94	12,851.05	275,875.80
Total	2,303,567.75	5,302.50	544,310.03	2,853,180.28	125,050.83	109.80	11,137.80	136,298.43	138,945.62	53,913.42	192,859.04	3,182,337.75

TABLE NO. 30.—*Statement of commissary and hotel coupon books issued during fiscal year ending June 30, 1915, for which collection has been made on pay rolls.*

	Commissary books.							Hotel books.					Grand total values.
	$2.50 books.		$5 books.		$15 books.		Total value.	$4.80 books.		$15 books.		Total value.	
	Number.	Value.	Number.	Value.	Number.	Value.		Number.	Value.	Number.	Value.		
1914—July	7,304	$18,260.00	36,196	$180,980.00	3,123	$46,845.00	$246,085.00	388	$1,862.40	1,968	$29,520.00	$31,382.40	$277,467.40
August	12,002	30,005.00	33,576	167,880.00	3,094	46,410.00	244,295.00	222	1,065.60	1,994	29,910.00	30,975.60	275,270.60
September	15,103	37,757.50	30,562	152,810.00	3,194	47,910.00	238,477.50	99	475.20	1,818	27,270.00	27,745.20	266,222.70
October	15,719	39,297.50	27,448	137,240.00	3,064	45,960.00	222,497.50	100	480.00	1,432	21,480.00	21,960.00	244,457.50
November	16,943	42,357.50	24,794	123,970.00	2,899	43,485.00	209,812.50	59	283.20	996	14,940.00	15,223.20	225,035.70
December	19,442	48,605.00	28,991	144,955.00	4,440	66,600.00	260,160.00	12	57.60	265	3,975.00	4,032.60	264,192.60
1915—January	18,328	45,820.00	24,963	124,815.00	4,077	61,155.00	231,790.00	7	33.60	155	2,325.00	2,358.60	234,148.60
February	19,742	49,355.00	22,254	111,270.00	3,797	56,955.00	217,580.00	25	120.00	80	1,200.00	1,320.00	218,900.00
March	21,229	53,072.50	23,460	117,300.00	3,985	59,775.00	230,147.50	4	19.20	58	870.00	889.20	231,036.70
April	20,449	51,122.50	25,012	125,060.00	3,985	59,775.00	235,957.50	3	14.40	21	315.00	329.40	236,286.90
May	24,977	62,442.50	25,526	127,630.00	4,233	63,495.00	253,567.50	3	14.40	....	....	14.40	253,581.90
June	24,699	61,747.50	27,382	136,910.00	4,287	64,305.00	262,962.50	14	67.20	....	....	67.20	263,029.70
Total	215,937	539,842.50	330,164	1,650,820.00	44,178	662,670.00	2,853,332.50	936	4,492.80	8,787	131,805.00	136,297.80	2,989,630.30

TABLE No. 31.—*Statement of meal tickets issued to employees during fiscal year ending June 30, 1915, for which collection has been made on pay rolls.*

	5-cent.		9-cent.		13½-cent.		27-cent.		40-cent.		Total value.
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	
1914—July	2,216	$110.80	709	$63.81	....	....	20,012	$5,403.24	41,187	$16,474.80	$22,052.65
August	1,695	84.75	1,001	90.09	....	....	20,745	5,601.15	34,908	13,963.20	19,739.19
September	436	21.80	1,201	108.09	....	....	20,981	5,664.87	27,757	11,102.80	16,897.56
October	720	36.00	1,782	160.38	792	$105.60	21,761	5,875.47	27,907	11,162.80	17,340.25
November	1,474	73.70	1,835	165.15	948	126.40	20,524	5,541.48	24,513	9,805.20	15,711.93
December	1,660	83.00	2,286	205.74	1,185	158.00	22,557	6,090.39	25,508	10,203.20	16,740.33
1915—January	2,041	102.05	4,438	399.42	993	132.40	19,405	5,239.35	24,324	9,729.60	15,602.82
February	1,983	99.15	4,970	447.30	783	104.40	17,623	4,758.21	19,597	7,838.80	13,247.86
March	2,367	118.35	6,453	580.77	801	106.80	17,410	4,700.70	21,634	8,653.60	14,160.22
April	2,704	135.20	7,541	678.69	564	75.20	14,829	4,003.83	22,846	9,138.40	14,031.32
May	2,934	146.70	10,129	911.61	519	69.20	14,498	3,914.46	23,748	9,499.20	14,541.17
June	2,833	141.65	9,899	890.91	591	78.80	14,447	3,900.69	19,574	7,829.60	12,841.65
Total	23,063	1,153.15	52,244	4,701.96	7,176	956.80	224,792	60,693.84	313,503	125,401.20	192,906.95

TABLE No. 32.—*Statement of commissary and hotel coupon books sold for cash during fiscal year ending June 30, 1915.*

	Commissary books.							Hotel books.					Grand total values.
	$2.50 books.		$5 books.		$15 books.		Total value.	$4.80 books.		$15 books.		Total value.	
	Number.	Value.	Number.	Value.	Number.	Value.		Number.	Value.	Number.	Value.		
1914—July	683	$1,707.50	8,885	$44,425.00	3,688	$55,320.00	$101,452.50	102	$489.60	1,548	$23,220.00	$23,709.60	$125,162.10
August	1,305	3,262.50	9,425	47,125.00	3,582	53,730.00	104,117.50	91	436.80	1,376	20,640.00	21,076.80	125,194.30
September	592	1,480.00	9,331	46,655.00	3,659	54,885.00	103,020.00	86	412.80	1,210	18,150.00	18,562.80	121,582.80
October	1,562	3,905.00	9,162	45,810.00	3,392	50,880.00	100,595.00	73	350.40	1,074	16,110.00	16,460.40	117,055.40
November	1,655	4,137.50	8,778	43,890.00	3,330	49,950.00	97,977.50	195	936.00	822	12,330.00	13,266.00	111,243.50
December	1,972	4,930.00	11,121	55,605.00	4,126	61,890.00	122,425.00	3	14.40	283	4,245.00	4,259.40	126,684.40
915—January	2,401	6,002.50	9,659	48,295.00	3,889	58,335.00	112,632.50	....	....	194	2,910.00	2,910.00	115,542.50
February	2,148	5,370.00	9,351	46,755.00	3,916	58,740.00	110,865.00	....	....	161	2,415.00	2,415.00	113,280.90
March	2,095	5,237.50	10,573	52,865.00	4,032	60,480.00	118,582.50	....	....	161	2,415.00	2,415.00	120,997.50
April	2,427	6,067.50	10,367	51,835.00	4,094	61,410.00	119,312.50	1	4.80	30	450.00	454.80	119,767.30
May	3,123	7,807.50	10,832	54,160.00	4,194	62,910.00	124,877.50	....	....	1	15.00	15.00	124,892.50
June	2,851	7,127.50	10,798	53,990.00	4,168	62,520.00	123,637.50	....	....	....	....	....	123,637.50
Total	22,814	57,035.00	118,282	591,410.00	46,070	691,050.00	1,339,495.00	551	2,644.80	6,860	102,900.00	105,544.80	1,445,039.80

TABLE NO. 33.—*Receipts, Canal Zone funds, from May 1, 1904, to June 30, 1915.*

[This statement includes balances in hands of collecting officers, but does not include money-order, bureau of clubs and playgrounds, or trust funds.]

On account of—	May 1, 1904, to June 30, 1914.	July 1, 1914, to June 30, 1915.	Total.
Revenues:			
Motor vehicle and conveyance licenses	$22,094.82	$4,827.60	$26,922.42
Insurance and corporation tax	5,009.69	1,536.70	6,546.39
Merchandise and peddling licenses	620,465.69	4,865.78	625,331.47
Public entertainment license	7,567.27	106.00	7,673.27
Slaughterhouse tax	93,626.01	408.00	94,034.01
Real estate tax	160,517.47	113.50	160,630.97
Court fees and fines	260,788.37	18,839.70	279,628.07
Market, land, and building rental	168,877.10	3,885.24	172,762.34
Water tax	140,308.91	574.60	140,883.51
Steamboat inspection	9,182.04	1,979.85	11,161.89
School tuition	4,963.95	1,365.83	6,329.78
Interest	179,418.19	48,798.35	228,216.54
Miscellaneous	76,667.90	3,231.54	79,899.44
Total revenues	1,749,487.41	90.532.69	1,840,020.10
Municipal funds transferred	83,660.36	....	83,660.36
Postal receipts:			
Postage stamps	687,652.38	75,827.80	763,480.18
Stamp books	1,117.03	362.99	1,480.02
Sale of mail matter	52.20	....	52.20
Handling Panama R. R. Co.'s mail	....	3,750.00	3,750.00
Box rents	....	2,973.65	2,973.65
Money-order fees	163,002.18	13,169.55	176,171.73
Exchange Martinique money-order business	96.68	67.78	164.46
Total postal receipts	851,920.47	96,151.77	948,072.24
Summary of receipts:			
Revenues	1,749,487.41	90,532.69	1,840,020.10
Municipal funds	83,660.36	....	83,660.36
Postal receipts	851,920.47	96.151.77	948,072.24
Total receipts	2,685,068.24	186,684.46	2,871,752.70

TABLE NO. 34.—*Expenditures, Canal Zone funds, from July 1, 1905, to June 30, 1915.*

[This statement includes all outstanding audited claims, but does not include expenditures of money-order, bureau of clubs and playgrounds, or trust funds.]

On account of—	July 1, 1905, to June 30, 1914.	July 1, 1914, to June 30, 1915.	Total.
Zone public works:			
Roads and trails—			
Construction	$472,079.36	$12,903.44	$484,982.80
Maintenance	128,308.29	30,911.47	159,219.76
Waterworks and sewers—			
Construction	51,612.59	352.61	51,965.20
Maintenance	12,099.71	1,404.31	13,504.02
Markets and slaughterhouses—			
Construction	20,661.09	....	20,661.09
Maintenance	33,336.22	309.80	33,646.02
Street lighting	8,520.19	672.46	9,192.65
Miscellaneous public works	62,875.79	85.60	62,961.39
Impounded animals	....	109.90	109.90
Sanitation, native villages	74,924.15	15,000.00	89,924.15
Incidental	....	15.00	15.00
Total Zone public works	864,417.39	61,764.59	926,181.98
Public schools:			
Salaries, superintendent, teachers, and clerks	417,343.84	54,522.42	471,866.26
Stationery and supplies	32,645.76	4,826.17	37,471.93
Corral service	....	1,457.90	1,457.90
Janitor service	18,117.25	3,949.22	22,066.47
Railroad transportation	....	2,782.00	2,782.00
Furniture and equipment	17,330.36	1,010.78	18,341.14

TABLE NO. 34.—*Expenditures, Canal Zone funds, from July 1, 1905, to June 30, 1915*—Continued.

On account of—	July 1, 1905, to June 30, 1914.	July 1, 1914, to June 30, 1915.	Total.
Public schools—Continued.			
Construction buildings	$98,095.97	$35,955.87	$134,051.84
Maintenance buildings	25,833.66	2,292.88	28,126.54
Traveling and miscellaneous	39,147.99	2,813.77	41,961.76
Total public schools	648,514.83	109,611.01	758,125.84
Miscellaneous:			
Salaries—			
Tax collectors	26,886.14		26,886.14
District judges	87,750.15		87,750.15
Magistrates	2,153.34	9,388.34	11,541.68
Supplies and miscellaneous	10,080.48	945.66	11,026.14
Equipment	453.53		453.53
Maintenance of charity patients	15,836.90	2,340.00	18,176.90
Municipal prisoners, rations	64,910.24	9,886.17	74,796.41
Total miscellaneous	208,070.78	22,560.17	230,630.95
Contingent expenses:			
Gratuity, discharged penitentiary prisoners	4,807.50	415.00	5,222.50
Election expenses	9,679.49		9,679.49
Incidentals	6,822.59	976.29	7,798.88
Total contingent expenses	21,309.58	1,391.29	22,700.87
Postal service:			
Purchase of stamps	277,333.42	22,895.75	300,229.17
Transportation of mails—			
Isthmus	74,256.84		74,256.84
Ocean	134,874.23	43,753.93	178,628.16
Stationery, office and miscellaneous supplies	55,242.65	3,544.08	58,786.73
Corral service		5,038.82	5,038.82
Repairs to furniture and fixtures		85.26	85.26
New equipment		1,362.52	1,362.52
Incidentals		1,880.18	1,880.18
Transfer to Panama Canal as reimbursement in part for salaries paid	238,513.21	15,000.00	253,513.21
Total Postal service	780,220.35	93,560.54	873,780.89
Summary of disbursements:			
Zone public works	864,417.39	61,764.59	926,181.98
Public schools	648,514.83	109,611.01	758,125.84
Miscellaneous	208,070.78	22,560.17	230,630.95
Contingent expenses	21,309.58	1,391.29	22,700.87
Postal service	780,220.35	93,560.54	873,780.89
Total disbursements	2,522,532.93	288,887.60	2,811,420.53

TABLE NO. 35.—*Statement of balances, Canal Zone funds, with collector, by appropriations, June 30, 1915.*

Public improvements and schools	$24,341.43
Miscellaneous and contingent	4,114.32
Postal receipts, 1915	31,791.41
Money-order funds	578,165.47
Clubhouse funds	19,906.69
Trust funds	13,680.25
Postal savings funds	120,796.00
Total	792,795.57

TABLE NO. 36.—*Statement of receipts and disbursements, Canal Zone funds, May 1, 1904 to June 30, 1915.*

Receipts:		
Revenues collected	$1,923,680.46	
Postal receipts	948,072.24	
Total collections		$2,871,752.70

Disbursements:		
Zone public works	$926,181.98	
Public schools	758,125.84	
Miscellaneous	230,630.95	
Contingent expenses	22,700.87	
Postal service	873,780.89	
Total disbursements		$2,811,420.53
Avâilable for expenditure		60,332.17
Collector's balance June 30, 1915:		
Public improvements and schools	24,341.43	
Miscellaneous and contingent	4,114.32	
Postal receipts, 1915	31,791.41	
	60,247.16	
Collecting officers' balance	62.25	
Postmasters' balance	46.01	
	60,355.42	
Unpaid audited claims	23.25	
		60,332.17
Separate statement covering postal service:		
Receipts—		
Stamp sales	763,480.18	
Stamp-book sales	1,480.02	
Sale of mail matter	52.20	
Handling Panama R. R. Co.'s mail	3,750.00	
Box rents	2,973.65	
Money-order fees	176,171.73	
Exchange Martinique money-order business	164.46	
		948,072.24
Disbursements—		
Balance of funds prior to Mar. 4, 1907, consolidated with regular Zone revenues	42,453.93	
Purchase of stamps	300,229.17	
Miscellaneous expenditures	320,038.51	
Transfer to Panama Canal as reimbursement in part for salaries paid	253,513.21	
		916,234.82
Available for expenditure		31,837.42
Collector's balance	31,791.41	
Postmasters' balance	46.01	
		31,837.42

Table No. 37.—*Postal service—Statement showing total value of money orders issued, money orders paid, money orders outstanding, and balance of money-order funds, June 30, 1915.*

	Money orders issued.	Money orders paid.				Total.
		United States.	Canal Zone.	Martinique.	Costa Rica.	
Year ending June 30—						
1907	$2,369,031.49	$1,581,251.91	$208,165.48			$1,789,417.39
1908	4,686,684.98	2,875,719.61	1,017,750.97			3,893,470.58
1909	5,166,749.46	3,583,419.57	1,492,144.76			5,075,564.33
1910	5,228,553.60	4,068,650.16	1,331,568.20	$2,267.60		5,402,485.96
1911	5,304,906.60	3,725,996.12	1,337,915.09	6,022.08		5,069,933.29
1912	4,915,077.26	3,521,511.95	1,280,397.88	8,176.95	$1,062.40	4,811,149.18
1913	4,883,624.13	4,286,948.31	881,728.73	9,646.65	3,046.10	5,181,369.79
1914	4,029,364.97	4,070,694.55	776,265.68	11,684.18	4,634.53	4,863,278.91
1915	2,873,182.84	2,699,533.06	431,004.25	6,183.64	1,250.55	3,137,971.50
Subtotal	39,457,175.33	30,413,725.24	8,756,941.04	43,981.10	9,993.58	39,224,640.96
Deposit money orders	1,075,570.00		722,680.00			722,680.00
Total	40,532,745.33	30,413,725.24	9,479,621.04	43,981.10	9,993.58	39,947,320.96

TABLE NO. 37.—*Postal service—Statement showing total value of money orders issued, money orders paid, money orders outstanding, and balance of money-order funds, June 30, 1915*—Continued.

SUMMARY.

Total money orders issued	$40,532,745.33	
Total money orders paid	39,947,320.96	
Total outstanding	585,424.37	
Money-order funds:		
Cash in hands of collector, Panama Canal	578,155.47	
Cash in hands of postmasters	15,520.54	
Due from Costa Rica postal department	88.85	
Due from Martinique postal department	3.40	
		$593,768.26
Due United States Postal Department	8,343.89	
Unpaid money orders outstanding	585,424.37	
		593,768.26

NOTE.—The Martinique list of paid Canal Zone orders for June, 1915, not included.

TABLE NO. 38.—*Postal service—Statement showing the monthly money-order business of the Canal Zone postal service during the fiscal year ending June 30, 1915.*

Month.	Money orders issued.	Fees.	Money orders paid in Canal Zone post offices.			
			United States.	Martinique.	Costa Rica.	Canal Zone.
1914—July	$362,036.80	$1,623.05	$7,704.19	....	$10.00	$53,006.44
August	285,303.72	1,330.09	7,165.22	....	5.00	43,209.22
September	256,502.20	1,212.90	7,058.28	$63.10	5.00	44,227.74
October	393,884.29	1,189.66	9,085.26	38.83	91.00	67,533.98
November	355,895.69	1,168.79	7,529.40	44.66	....	88,126.92
December	337,802.43	1,259.25	8,006.02	34.12	52.35	95,773.82
1915—January	311,174.26	983.84	9,485.00	2.00	149.00	92,807.29
February	316,797.15	1,023.37	7,313.68	38.88	....	106,978.89
March	343,076.15	1,132.45	14,959.78	1.94	10.00	153,564.38
April	308,188.26	1,096.81	11,489.18	....	25.00	137,787.28
May	334,845.86	1,120.83	10,840.89	....	150.00	146,886.55
June	343,246.03	1,047.88	8,567.92	3.40	140.10	123,781.74
		14,188.92				
Fees refunded account of European war	....	19.37	....	....	....	....
Liquidation of defalcation	....	1,000.00	....	....	....	....
Total	[1] 3,948,752.84	13,169.55	109,204.82	226.93	637.45	[2] 1,153,684.25

Month.	Canal Zone orders paid in—			Cash remittances to United States Post Office Department.
	Martinique.	Costa Rica.	United States.	
1914—July	[3] $1,246.85	[3] $473.60	$220,388.34	$348,000.00
August	....	....	268,610.00	277,000.00
September	1,577.35	200.50	172,325.35	276,000.00
October	....	....	237,669.43	215,000.00
November	....	....	236,561.99	225,000.00
December	2,189.59	191.20	224,078.86	255,000.00
1915—January	....	....	405,204.65	268,900.00
February	....	....	161,813.30	385,508.33
March	1,169.85	....	147,214.26	194,370.00
April	....	....	252,999.19	200,720.00
May	....	....	187,958.61	229,408.75
June	....	385.25	184,709.08	178,500.00
Total	6,183.64	1,250.55	2,699,533.06	3,053,407.08

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[1] Includes deposit money orders issued.
[2] Includes deposit money orders paid.
[3] Includes June, 1913.

Orders issued, 170,558; average value of each, $23.15.

TABLE NO. 39.—*Statement of money-order business and postal receipts for the fiscal year ended June 30, 1915.*

Station.	Amount issued.	Money orders paid at Canal Zone post offices.			
		United States.	Canal Zone.	Martinique.	Costa Rica.
Ancon	$780,257.63	$25,345.72	$190,977.74	$120.04	$315.45
Balboa	668,691.76	17,107.02	198,126.19		
Balboa Heights	257,728.05	2,741.87	101,083.97		
Corozal	367,633.55	6,346.79	124,840.62		
Cristobal	953,131.60	32,880.89	235,445.89	77.72	317.00
Culebra	96,348.40	5,314.00	29,377.59		5.00
Empire	90,779.46	2,978.28	24,490.83		
Gatun	200,485.40	2,193.07	70,315.20		
Las Cascadas	93,143.65	8,057.49	37,986.75		
Paraiso	282,422.01	3,301.45	83,771.13	29.17	
Pedro Miguel	158,131.33	2,938.24	55,768.34		
Invalidated money orders paid by warrant			1,500.00		
Total	[1] 3,948,752.84	109,204.82	[2] 1,153,684.25	226.93	637.45

Station.	Money-order fees.	Postal receipts.			Total revenue.
		Stamp sales.	Box rents.	Newspaper postage.	
Ancon	$3,243.27	$19,786.20	$852.00	$986.60	$24,868.07
Balboa	2,219.12	8,876.50	378.00		11,473.62
Balboa Heights	887.47	3,365.07	530.00		4,782.54
Corozal	1,121.39	3,547.90	181.50		4,850.79
Cristobal	3,534.77	21,450.21	588.00	1.90	25,574.88
Culebra	393.13	2,550.69	24.00		2,967.82
Empire	384.56	3,039.82	31.15		3,455.53
Gatun	721.96	3,527.54	119.00		4,368.50
Las Cascadas	290.65	3,181.78	20.50		3,492.93
Paraiso	917.91	3,141.20	190.50		4,249.61
Pedro Miguel	474.69	1,508.26	60.00		2,042.95
Station B		423.19			423.19
Depot Quartermaster, Mount Hope		255.00			255.00
Frijoles		24.31			24.31
Gamboa		409.52			409.52
Executive secretary		27.50			27.50
Storekeeper, S. D., Balboa		85.00			85.00
Panama R. R., Balboa Docks		2.60			2.60
	14,188.92		2,974.65		93,354.36
Money-order fees refunded on account European war	19.37				19.37
Liquidation of defalcation	1,000.00				1,000.00
Refund of box rents, paid in advance			1.00		1.00
Total	13,169.55	75,202.29	2,973.65	988.50	92,333.99

[1] Includes deposit money orders issued.

[2] Includes deposit money orders paid.

Deposit money order system established October 1, 1914. Depot Quartermaster account discontinued March 1, 1915. Frijoles account discontinued September 30, 1914.

TABLE No. 40.—*Statement of savings-bank transactions for the fiscal year ended June 30, 1915.*

Post office.	Postal savings certificates.					
	Balance unpaid July 1, 1914.	Deposits.	Transfers in.	Transfers out.	Withdrawals.	Balance on deposit June 30, 1915.
Ancon	$65,692.00	$167,222.00	$1,325.00	$810.00	$193,249.00	$40,180.00
Balboa	75,847.00	114,348.00	1,352.00	1,070.00	180,058.00	10,419.00
Balboa Heights	....	....	....	....	....	....
Corozal	92,480.00	127,540.00	150.00	670.00	190,662.00	28,838.00
Cristobal	72,433.00	168,399.00	4,671.00	260.00	238,154.00	7,089.00
Culebra	33,251.00	31,621.00	1,345.00	1,678.00	64,539.00	....
Empire	27,631.00	17,586.00	63.00	3,270.00	42,010.00	....
Gatun	35,643.00	64,308.00	965.00	2,507.00	86,969.00	11,440.00
Las Cascadas	10,120.00	13,438.00	....	13.00	23,545.00	....
Paraiso	44,592.00	52,710.00	2,125.00	451.00	91,132.00	7,844.00
Pedro Miguel	40,792.00	47,579.00	1,258.00	2,525.00	68,253.00	18,851.00
Total	498,481.00	804,751.00	13,254.00	13,254.00	1,178,571.00	124,661.00

Post office.	Deposit money orders.		
	Issued.	Paid.	Balance on deposit June 30, 1915.
Ancon	$135,875.00	$94,980.00	$40,895.00
Balboa	213,580.00	139,965.00	73,615.00
Balboa Heights	61,120.00	41,260.00	19,860.00
Corozal	126,405.00	93,985.00	32,420.00
Cristobal	216,755.00	129,490.00	87,265.00
Culebra	28,745.00	22,370.00	6,375.00
Empire	21,890.00	13,690.00	8,200.00
Gatun	67,515.00	45,665.00	21,850.00
Las Cascadas	44,720.00	35,255.00	9,465.00
Paraiso	97,285.00	63,405.00	33,880.00
Pedro Miguel	61,680.00	42,615.00	19,065.00
Total	1,075,570.00	722,680.00	352,890.00

NOTE.—The issue of postal savings certificates discontinued Oct. 1, 1914. Postal savings system abolished at Culebra Apr. 28, 1915; Empire Mar. 29, 1915; Las Cascadas Feb. 27, 1915.

TABLE No. 41.—*Statement of receipts and disbursements by the bureau of clubs and playgrounds for the fiscal year 1915.*

Clubhouse.	Cash on hand July 1, 1914.	Balance on deposit with collector July 1, 1914.	Receipts July 1, 1914, to June 30, 1915.	Total.	Disbursements July 1, 1914, to June 30, 1915.	Cash on hand June 30, 1915.	Balance on deposit with collector June 30, 1915.	Total balance available June 30, 1915.
Balboa	$281.99	$1,768.59	$21,394.47	$23,445.05	$20,335.09	$409.64	$2,700.32	$3,109.96
Corozal	341.23	2,903.03	21,727.69	24,971.95	21,973.79	168.22	2,829.94	2,998.16
Cristobal	282.60	4,560.70	24,371.11	29,214.41	23,648.18	59.37	5,506.86	5,566.23
Gatun	340.77	5,549.74	18,056.30	23,946.81	18,739.07	302.58	4,905.16	5,207.74
La Boca	....	....	4,894.49	4,894.49	3,409.65	[1] 676.11	808.73	1,484.84
Pedro Miguel	235.40	921.70	12,539.95	13,697.05	12,949.92	207.08	540.05	747.13
Superintendent's account	635.13	9,066.00	2,422.47	12,123.60	9,898.16	25.00	2,200.44	2,225.44
	2,117.12	24,769.76	105,406.48	132,293.36	110,953.86	1,848.00	19,491.50	21,339.50
Unpaid audited vouchers, June 30, 1915							415.19	
Collector's balance, as shown on account current June 30, 1915							19,906.69	

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[1] Included in the cash on hand at La Boca clubhouse June 30, 1915, is $532.39, being the value of commissary coupons forwarded to the Auditor, but for which credit has not as yet been allowed by the Panama R. R. Co.

NOTE.—All the accounts of closed clubhouses are included in "Superintendent's account."

TABLE NO. 42.—*Receipts by the bureau of clubs and playgrounds July 1, 1914, to June 30, 1915.*

	Balboa.	Corozal.	Cristobal.	Gatun.	La Boca.	Pedro Miguel.	Superintendent's account.	Total.
Membership	$2,826.50	$2,442.44	$2,715.00	$2,660.50	$374.25	$1,893.00	$310.00	$13,221.69
Soda fountain	7,795.86	8,786.03	10,768.85	7,661.62	2,444.32	4,541.82	855.18	42,853.68
Billards and pocket billards	1,019.80	631.87	1,063.05	654.10	245.65	559.70	155.87	4,330.04
Barber shop	82.50	98.50	66.54	77.00	45.00			369.54
Bowling alleys	707.40	604.90	864.90	820.30		558.60	155.70	3,711.80
Salable merchandise	346.69	410.26	612.81	359.60		235.65	23.71	1,988.72
Entertainments:								
States	919.63	469.40	716.58	441.14	.35	638.75		3,185.85
Local	639.95	154.40	118.70	184.20		328.70		1,425.95
Motion pictures	1,381.10	1,681.87	875.60	1,389.65	131.15	1,514.31	186.54	7,160.22
Library deposits and fines	184.20	80.63	84.25	100.37	11.80	124.55	7.50	593.30
Educational activities	120.25		211.50	8.00		55.00		394.75
Physical activities				5.50				5.50
Playgrounds					403.35			403.35
Pressing Club	545.50	511.50	93.50	178.50	5.00	187.00	17.50	1,538.50
Hall rent					15.00			15.00
Tennis club	160.16					17.00		177.16
Tournaments	212.50	88.50	343.50	115.90		100.25	117.00	977.65
Cigars and candy	4,452.43	5,757.89	5,785.33	3,387.92	1,218.62	1,783.12	593.47	22,978.78
Locker rental and dormitory		9.50	51.00	12.00		2.50		75.00
Total	21,394.47	21,727.69	24,371.11	18,056.30	4,894.49	12,539.95	2,422.47	105,406.48

TABLE NO. 43.—*Disbursements by the bureau of clubs and playgrounds July 1, 1914, to June 30, 1915.*

	Balboa.	Corozal.	Cristobal.	Gatun.	La Boca.	Pedro Miguel.	Superintendent's account.	Total.
Billards and pocket billards:								
Salaries	$326.00	$590.37	$686.36	$427.50	$10.00	$132.67	$153.58	$2,626.48
Supplies and equipment	377.56	230.09	112.49	150.03	98.92	86.90	(39.16)	1,016.83
Bowling alleys:								
Salaries	755.26	738.91	1,213.58	878.72		591.48	264.04	4,441.99
Supplies and equipment	60.67	30.12	54.53	167.27	1.08	11.18		324.85
Entertainments:								
Local	1,221.48	670.44	735.17	927.15	14.00	906.55	330.98	4,805.77
States	1,463.08	987.29	1,349.98	886.41		990.71	231.18	5,908.65
Motion pictures	1,566.45	1,247.56	1,017.69	1,152.02	140.81	1,298.67	401.06	6,824.26
Office help	822.72	1,006.88	1,245.67	1,179.08	114.15	970.40	367.12	5,706.02
Library books and periodicals	372.17	243.30	498.88	382.96	144.54	388.18	6.65	2,036.68
Maintenance and general expense	927.20	902.90	573.69	787.51	106.94	703.87	137.17	4,139.28
Gymnasium supplies and equipment	209.44	65.60	93.81	85.28	18.27	51.82	3.85	528.07
Salable merchandise	367.94	226.59	248.47	176.75		123.74	(1.69)	1,141.80
General equipment, supplies, and expenses	496.63	362.78	349.44	378.94	66.16	227.37	109.53	1,990.85
Soda fountain	6,486.32	8,102.29	9,158.25	7,183.65	1,680.96	4,028.73	1,255.64	37,895.84
Pressing club	481.63	670.05	87.25	318.34		256.62	61.59	1,875.48
Tennis club	31.04						863.40	894.44
Gun club	1.10							1.10
Educational activities	151.08	2.27	252.27	28.52	1.99	63.45		499.58
Physical activities	151.15	12.91	50.74	76.00		29.68	18.01	338.49
Religious activities	86.52	22.81	38.32	118.95	4.05	28.05		298.70
Refunds	81.67	157.92	105.10	111.00	7.50	102.00	155.74	723.93
Tournaments	32.95	168.44	482.02	100.40		116.79	229.05	1,129.65
Cigars and candy	3,843.99	5,192.93	5,288.59	3,216.72	709.77	1,535.18	900.25	20,987.43
Playgrounds	6.37	5.87	5.88	5.87	290.51	5.88	3,323.76	3,644.14
Baseball grounds							1,126.41	1,126.41
Barber shop	11.67	35.47						47.14
Total	20,335.09	21,973.79	23,618.18	18,739.07	3,409.65	12,919.92	9,898.16	110,953.86

NOTE.—Figures in parentheses are credits.

TABLE NO. 44.—*Statement of amounts paid under the act of May 30, 1908, to employees as compensation and on account of deaths of employees injured in the course of employment and amounts paid under act of Feb. 24, 1909, for injuries lasting 15 days or less, amounts paid under Executive order of Feb. 26, 1913, and amounts paid under Executive Order No. 1902, dated Mar. 20, 1914, covering period from Aug. 1, 1908, to June 30, 1915.*

Total payments, by fiscal years, to date.	Injuries.	Deaths.	Under act of Feb. 24, 1909.	Total.
Aug. 1, 1908, to June 30, 1909	$32,355.71	$3,682.79	$8,225.16	$44,263.66
July 1, 1909, to June 30, 1910	96,810.33	21,053.22	16,010.30	133,873.85
July 1, 1910, to June 30, 1911	168,416.23	35,248.39	49,957.80	253,622.42
July 1, 1911, to June 30, 1912	166,620.21	37,534.68	55,838.25	259,993.14
July 1, 1912, to June 30, 1913	150,943.79	23,792.02	49,335.91	224,071.72
July 1, 1913, to June 30, 1914	111,240.75	41,015.34	33,704.92	185,961.01
July 1, 1914, to June 30, 1915	17,703.40	14,268.97	....	31,972.37
Total	744,090.42	176,595.41	213,072.34	1,133,758.17
Payments under Executive order of Feb. 26, 1913	....	....	....	7,808.71
Payments under Executive order of Mar. 20, 1914, from Apr. 1 to June 30, 1914	....	....	....	4,283.82
Payments under Executive order of Mar. 20, 1914—July 1, 1914, to June 30, 1915	41,871.91	43,017.71	....	84,889.62
Payments made under special acts of Congress	....	....	....	35,218.37
Total	....	....	....	1,265,958.69
Amounts paid Panama R. R. employees:				
Apr. 1, 1914, to June 30, 1914	770.61	....	....	770.61
July 1, 1914, to June 30, 1915	10,275.45	2,300.42	....	12,575.87
Grand total	....	....	....	1,279,305.17

TABLE No. 45.—*Statement of amounts paid under Executive Order No. 1902, dated Mar. 20, 1914, as compensation to employees injured and on account of deaths of employees injured while directly engaged in actual work, July 1, 1914, to June 30, 1915.*

Department or division.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total injury.	Total death.	Grand total.
Mechanical:															
Injury	$1,814.59	$585.76	$520.43	$741.35	$634.34	$976.87	$915.03	$1,092.46	$2,548.17	$667.57	$1,402.03	$940.63	$12,839.23		
Death							1,011.61	2,223.84						$3,235.45	$16,074.68
General construction:															
Injury	36.00	26.46	69.33	174.05	58.44	71.61	54.74	28.84	19.50	45.00	96.16		680.13		
Death															680.13
Supply (quartermaster branch):															
Injury	257.37	241.53	312.67	385.79	137.60	157.30	192.04	102.00	99.10	84.88	85.03	40.78	2,096.09		
Death															2,096.09
Supply (subsistence):															
Injury	4.13	8.26	52.58	4.64		10.25	5.38			2.81			88.05		
Death															88.05
Building construction:															
Injury	172.35	333.39	330.56	337.11	41.25	64.82	100.51	134.82	31.73	136.23	242.44	162.52	2,087.73		
Death							938.22		1,872.64					2,810.86	4,898.59
Fortifications:															
Injury	117.41	146.98	227.40	166.10	362.52	126.90	51.28	34.80	84.90	149.10	76.50	22.75	1,566.64		
Death							402.34							402.34	1,968.98
Health:															
Injury	6.66	6.60	16.63	13.11	13.43	18.90			41.77	50.38		4.20	171.68		
Death															171.68
Erection:															
Injury	209.30	320.43	685.34	315.39									1,530.46		
Death			2,394.91											2,394.91	3,925.37
Dredging:															
Injury	75.85	634.57	537.19	346.19	399.37	355.47	258.49	239.93	230.92	176.20	379.63	286.87	3,920.68		
Death	2,500.00	3,514.37			4,239.41	328.97	1,287.78	2,949.45	1,363.47			19.93		16,203.38	20,124.06
Terminals:															
Injury	350.34	643.68	500.77	641.15	545.45	439.56	961.06	580.64	500.12	401.70	735.91	512.70	6,813.08		
Death			600.00				342.13	3,765.05						4,707.18	11,520.26
Transportation:															
Injury	311.00	15.00	61.29	275.74	172.13	93.21	33.25	222.63	200.30	145.38	9.38	92.89	1,692.20		
Death						1,233.64		250.00	1,723.82					3,207.46	4,899.66
Municipal engineering:															
Injury	95.08	116.72	82.76	374.60	193.45	163.92	1,508.55	51.60	99.77	161.73	115.75	304.62	3,268.55		
Death															3,268.55
Police and fire protection:															
Injury		29.00	10.50		18.00	27.50	28.88	40.50	40.50		30.25		225.13		
Death															225.13
Electrical:															
Injury	50.97	46.54	10.59	182.66	93.60	120.27	170.58	97.98	172.90	97.72	3,382.82	46.46	4,473.09		
Death			3,831.85				2,223.84							6,055.69	10,528.78

Locks:															
Injury			4.95	9.30	30.15	56.01	47.10	84.85	69.62	38.10	30.00	38.78	408.86		
Death						4,000.44								4,000.44	4,409.30
Meteorology and hydrography:															
Injury												10.31	10.31		
Death															10.31
Total	6,001.05	6,669.29	10,249.75	3,967.18	6,939.14	8,245.64	10,532.81	11,899.39	9,159.23	2,156.80	6,585.90	2,483.44	41,871.91	43,017.71	84,889.62

TABLE NO. 46.—*Table of injuries for the period from July 1, 1914, to June 30, 1915, Panama Canal employees.*

Cause of injury.	Nature of injury.																																							
	Paralysis of legs.	Loss of 1 arm above elbow.	Loss of 1 leg above knee.	Loss of 1 foot above ankle.	Loss of sight, 1 eye.	Loss of thumb.	Loss of 1 finger.	Loss of more than 1 finger.	Loss part of thumb or finger.	Loss of other than great toe.	Other permanent disability.	Fracture of skull.	Fracture of thigh.	Fracture of arm above elbow.	Fracture of pelvis.	Fracture of leg.	Fracture of forearm.	Fracture of ribs.	Fracture of foot.	Fracture of collar bone.	Fracture of jaw.	Fracture of 1 or more toes.	Fracture of 1 or more fingers.	Abrasions.	Burns.	Contusions.	Hernia.	Incisions.	Infections.	Injury to eyes.	Lacerations.	Punctures.	Multiple slight injuries.	Sprains.	Other temporary disability.	Fatal.	Total.
Animals (kicks, bites, falls from, etc.)																										2			1					1	1		5
Blow of hammer or other object					1																	1	4	3		42	2	8	2	2	16				16		97
Caught between two hard bodies				1			1	1	8				1	1	1	2		1	1				11	15		71		6	2		45	2		3	35	1	209
Collapse of material																										1					1		1	1			4
Contact with gear							1	2	2		1										1			1		4		1			6				3		22
Contact with machinery						1	1	2	3		1						1						2	4		23		5	1		25		1		7	1	78
Contact with rough edge or surface				1			1		1														1	9	3	32		10	10		22	4			22		116
Contact (sharp instruments, splinters, etc.)							1		1														5			4		30	37	4	29	32	1		3	1	148
Derailment of locomotive, other moving objects												1					1							1		5					3			3			14
Explosions (boilers, pipes, gases, etc.)																									4					1							5
Explosions (powder, dynamite)													1			1		1			1				1	9					1		1		1	7	24
Electric current																									6										1	3	10
Falls from elevation				1										1	1	1	7	3	2				2	10		84	2	4	3		13	1	16	20	35	4	210
Falls into excavation																2									1	14	1					1	1	4	7	1	32
Falls on even surface	1																3			1				4	1	25	3	7	1	1	18	4	1	15	20		105
Falls from cars or other moving bodies		2																1	1							3					2			2	2	2	15
Hot metals, inflammable, corrosive substances																									52	1			1	10							64
Lifting, pushing, and pulling																		1				2	3	5	1	60	42	5	6	1	26	12	2	26	46	1	239
Operating hand car																1			1					2		10		1			3		3	2	7		30
Struck by flying object					2				1					1			1				2		2	3	2	25		14	5	113	28	10	1		18	2	230
Struck by moving body (engines, etc.)			1	1				1		1			1			2	1		3			1		5		30			2		4		3	1	10	2	69
Struck by falling body			1	2			1	1	3	2		4		2		6	3		19			8	11	21	1	287	1	24	12	8	99	7	6	11	78	6	624
Struck by swinging or loose object				1					1							2	2		2				1	7		52		14	6		15	1	1	1	15	1	122
Stepping on nails, other sharp instruments									1																			3	13		4	196		3	2		222
Using hand tools or simple instruments																							3	1		8	1	18	6	1	15	2		3	10		68
Vapors, gases, or poisonous substances																									25					1					1		27
Other causes																	2							3	3	13	2		6	1	7	1		8	20	15	81
Compensated	1		1	6	3	1	6	7	13	3	2	3	3	4	2	15	16	7	24		4	12	37	38	42	287	38	48	76	40	161	43	16	29	92	23	1,103
Noncompensated		2	1	1					8			2		1		2	5		5	1			8	56	58	518	16	102	38	103	221	230	22	75	268	24	1,767
Total	1	2	2	7	3	1	6	7	21	3	2	5	3	5	2	17	21	7	29	1	4	12	45	94	100	805	54	150	114	143	382	273	38	104	360	47	2,870

TABLE NO. 47.—*Table of injuries for the period from July 1, 1914, to June 30, 1915, Panama Canal employees.*

Character of work at time of injury.	Cause of injury.																											
	Animals, kicks, bites, falls from, etc.	Blow of hammer or other object.	Caught between two hard bodies.	Collapse of material.	Contact with gear.	Contact with machinery.	Contact with rough edge or surface.	Contact, sharp instruments, splinters, glass, etc.	Derailment of locomotive; other moving object.	Explosions (boilers, pipes, gases, etc.).	Explosions (powder, dynamite).	Electric current.	Fall from elevations.	Fall into excavations.	Fall on even surface.	Fall from cars, etc., or other moving body.	Hot metals, inflammable or corrosive substance, liquid.	Lifting, pushing, and pulling.	Operating hand car.	Struck by flying object.	Struck by moving body (engines, cars, etc.).	Struck by falling body.	Struck by swinging or loose object.	Stepping on nails or other sharp instrument.	Using hand tools or simple instruments.	Vapors, gases, or poisonous substance.	Other causes.	Total.
Aids to navigation	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	....	....	....	1	5
Air and water supply	....	....	1	....	....	1	....	....	....	....	....	....	....	....	1	....	2	4	1	....	....	13	1	2	1	1	....	28
Breakwaters and moles	....	....	6	....	....	....	1	1	....	....	....	....	1	....	2	1	1	1	....	3	1	4	3	1	2	....	1	29
Building construction, repairing, etc	1	5	9	....	1	6	11	22	1	....	....	....	44	4	14	4	9	19	....	14	4	39	8	56	3	1	3	278
Docks, quays, wharves, etc	....	....	7	....	1	2	3	6	....	....	....	1	6	2	4	....	....	12	....	4	1	27	2	5	....	1	1	85
Drilling and blasting	....	4	6	....	....	3	2	6	....	....	....	....	11	....	2	....	2	8	....	4	3	28	5	7	....	1	4	96
Commissary, storehouses, etc	....	2	1	....	....	....	2	....	....	....	21	....	2	....	....	....	....	1	....	5	....	12	....	1	....	....	....	47
Dry docks and coaling plants	....	8	29	1	2	5	5	13	3	....	....	....	23	2	12	....	2	24	1	33	7	86	20	19	7	7	9	318
Electrical installation and operation	1	3	7	....	....	1	3	5	....	1	....	4	7	....	3	....	5	5	....	3	....	14	2	20	2	....	3	89
Excavation:																												
Dry, by hand	....	....	....	....	....	....	....	2	....	....	....	....	2	....	....	....	....	3	....	....	2	10	1	2	2	....	....	24
Dry, by machinery	....	....	1	....	....	....	1	....	1	....	....	....	1	3	....	....	1	3	....	1	1	17	....	2	....	....	1	33
Wet, dredging, sluicing	....	5	18	....	6	7	11	14	....	1	....	2	14	5	12	....	2	14	....	8	....	28	13	7	3	6	8	184
Field repairs to equipment, etc	....	6	10	....	3	4	5	6	....	....	....	....	24	4	9	....	2	7	....	22	....	31	11	4	5	1	6	160
Fortifications	....	2	8	....	....	1	5	8	2	1	....	....	13	2	5	1	....	13	1	14	8	54	2	26	3	2	3	174
Hotels, messes, operation of	....	....	....	....	....	....	1	4	....	....	....	....	1	....	2	....	2	1	....	1	....	....	2	1	....	....	1	16
Inspection, checking, field	....	....	....	....	....	....	....	1	....	....	....	....	2	....	1	....	....	....	....	....	1	1	1	....	....	....	5	12
Loading and unloading	....	....	20	....	....	2	6	3	....	....	....	1	7	....	2	....	1	39	2	1	3	45	3	6	....	....	....	141
Locks and spillways	....	3	3	1	....	2	1	2	2	....	....	2	4	2	3	....	....	3	....	3	5	15	5	3	2	....	2	63
Municipal improvements	....	3	9	1	2	....	3	6	....	....	....	....	2	1	4	....	1	13	....	15	12	27	4	14	8	....	3	128
Office work, courts, etc	....	....	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	4
Plants, manufacturing and repair	1	52	54	1	7	35	35	33	....	2	....	....	19	2	14	1	29	46	2	89	7	140	20	25	25	4	13	656
Policing, fire protection, etc	....	2	....	....	....	....	....	....	....	....	2	....	3	....	2	....	....	....	....	1	4	2	1	2	....	....	4	23
Sanitation, field work of	1	....	1	....	....	....	2	5	....	....	....	....	2	....	....	....	1	4	....	2	1	2	....	2	3	....	1	27
Tracks, construction and maintenance	....	1	5	....	....	4	....	2	....	....	....	....	2	....	1	....	....	8	....	1	1	10	....	2	1	....	3	41
Transportation:																												
Railway	....	....	9	....	....	1	8	2	2	....	1	....	8	2	5	4	2	3	....	1	7	3	5	2	....	2	2	69
Water	....	....	2	....	....	1	4	3	....	....	....	....	4	2	3	1	1	3	....	1	....	4	10	2	....	....	5	46
Other	....	....	....	....	....	1	....	....	3	....	....	....	....	1	....	1	....	....	22	....	1	1	....	....	....	....	....	30
Other characters of work	1	1	2	....	....	2	6	3	....	....	....	....	8	....	4	2	1	5	1	4	....	9	2	10	1	....	2	64
Total	5	97	209	4	22	78	116	148	14	5	24	10	210	32	105	15	64	239	30	230	69	624	122	222	68	27	81	2,870

TABLE NO. 48.—*Receipts, issues, and transfers of stores, and purchases delivered to divisions and accountable officials during the fiscal year 1914–15.*

Month.	Receipts by—		
	Purchase.	Transfers.	Manufacture.
1914—July	$375,311.75	$739,220.61	$96,599.06
August	589,517.86	558,518.50	74,360.21
September	620,842.83	342,013.53	36,180.40
October	429,861.99	506,700.49	9,913,77
November	352,293.26	924,189.67	51,913.68
December	819,930.25	430,196.78	32,658.36
1915—January	443,525.06	949,597.17	36,864.27
February	351,353.30	268,816.80	46,267.65
March	519,846.10	387,591.52	80,662.38
April	373,808.48	282,133.25	37,039.95
May	298,505.76	236,347.06	15,410.63
June	1,122,483.75	873,787.82	89,872.06
Total	6,297,280.39	6,499,113.20	607,742.42

Month.	Issues by—				Purchases to divisions and accountable officials.
	Foremen's orders.	Transfers.	Sales.	Surveys.	
1914—July	$847,873.48	$515,209.67	$26,739.60	$3,451.19	$574,439.12
August	731,134.19	460,485.17	57,150.80	896.79	838,944.44
September	886,150.63	464,767.16	14,624.71	1,544.76	836,231.66
October	671,367.24	380,538.49	25,847.29	2,906.71	658,290.55
November	560,598.31	719,358.82	21,367.73	1,369.07	766,094.41
December	875,826.03	409,367.46	20,364.89	3,506.12	426,388.06
1915—January	619,076.49	887,190.04	25,224.13	145,792.45	617,994.79
February	451,805.50	227,567.74	11,836.36	76,474.53	177,035.00
March	480,488.66	306,983.75	31,689.29	139,266.38	413,529.46
April	414,520.68	200,454.07	49,633.01	12,768.15	1,077,574.93
May	484,015.52	281,914.81	75,776.05	8,010.84	788,985.25
June	839,219.70	427,483.43	46,286.36	797,346.13	1,484,236.86
Total	7,862,076.43	5,281,320.61	406,540.22	1,193,333.12	8,659,744.53

Regular stock in quartermaster stores, July 1, 1914	$4,100,126.31
Material in hands of divisions, July 1, 1914	508,173.89
Obsolete material on hand July 1, 1914[1]	233,485.06
Regular stock in quartermaster stores, July 1, 1915	3,284,244.35
Material in hands of divisions, July 1, 1915	433,120.51
Obsolete material on hand, July 1, 1915[1]	611,838.35

TABLE NO. 49.—*Panama Canal supply department, commissary branch, year ended June 30, 1915.*

C. I. F. COST OF MATERIAL AND SUPPLIES SOLD DURING THE YEAR ENDING JUNE 30, 1915.

	On hand July 1, 1914.	Purchases.	On hand June 30, 1915.	Sold.
Groceries	$249,840.19	$1,538,413.75	$273,942.23	$1,514,311.71
Hardware and furniture	91,527.36	205,314.13	77,267.26	219,574.23
Dry goods	356,342.37	824,414.17	435,428.21	745,328.33
Boots and shoes	86,092.09	273,443.46	147,549.56	211,985.99
Cold storage	94,724.42	1,832,382.79	74,726.73	1,852,380.48
Tobacco	48,923.84	239,723.12	30,295.69	258,351.27
Raw material	47,788.55	175,388.58	41,123.16	182,053.97
Total	975,238.82	5,089,080.00	1,080,332.84	4,983,985.98

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[1] Includes scrap.

TABLE No. 49.—*Panama Canal supply department, commissary branch, year ended June 30, 1914*—Continued.

PERCENTAGE OF SURCHARGE EARNED ON COST.

	Sold.	Earned surcharge.	Percentage earned on cost.
Groceries	$1,514,311.71	$294,530.49	19.45
Hardware and furniture	219,574.23	35,652.56	16.24
Dry goods	745,328.33	192,508.05	25.83
Boots and shoes	211,985.99	47,769.64	22.53
Cold storage	1,852,380.48	363,769.04	19.64
Tobacco	258,351.27	106,734.98	41.31
Total	4,801,932.01	1,040,964.76	21.68

LOCATION OF PURCHASES.

United States	$4,326,714.67
Foreign	575,225.07
Local	141,951.66
Panama Canal	45,188.60
Total	5,089,080.00

CLASSIFICATION BY COMMODITIES.

Groceries	$1,538,413.75
Hardware and furniture	205,314.13
Dry goods	824,414.17
Boots and shoes	273,443.46
Cold storage	1,832,382.79
Tobacco	239,723.12
Raw material	175,388.58
Total	5,089,080.00

TABLE No. 50.—*Supply department, commissary branch—Statement showing distribution of sales for the year ending June 30, 1915.*

	Commissary department.	Manufacturing plants.	Total.
To Panama Canal	$1,145,535.85	$158,219.45	$1,303,755.30
Panama R. R.	10,003.70	11,272.09	21,275.79
Individuals and companies	105,387.34	12,710.42	118,097.76
United States Government	572,407.07	79,462.45	651,869.52
Steamships	131,458.78	18,769.92	150,228.70
Panama R. R. restaurant		260.54	260.54
Washington Hotel	47,138.09	8,970.29	56,108.38
Paid orders	80,803.27	78,265.71	159,068.98
Coupons	3,753,807.08	35,226.53	3,789,033.61
Total	5,846,541.18	403,157.40	6,249,698.58
Supplied for equipment:			
Commissary expense	65,177.28	78,738.91	143,916.19
Raw material for expense	190.18	387.73	577.91
General expense	602.15	702.90	1,305.05
Plants for expense		89,567.40	89,567.40
Equipment	870.06		870.06
Total	66,839.67	169,396.94	236,236.61
Grand total	5,913,380.85	572,554.34	6,485,935.19
Loss by condemnation, shrinkage, etc			95,837.71
Loss by clerical errors, pilfering, fire, etc			84,871.94
			6,666,644.84

TABLE NO. 51.—*Detailed statement of classified expenditures in department of civil administration and Canal Zone government for the fiscal year ending June 30, 1915, and total from beginning of work to date.*

	Zone funds.		Civil administration.		Grand total.	
	Total fiscal year 1915.	Total to June 30, 1915.	Total fiscal year 1915.	Total to June 30, 1915.	Total fiscal year 1915.	Total to June 30, 1915.
Administration			$8,891.62	$665,868.82	$8,891.62	$665,868.82
Supreme and circuit courts				396,429.00		396,429.00
Prosecuting attorney				39,558.47		39,558.47
District courts (old) magistrates	$10,334.00	$96,526.49			10,334.00	96,526.49
District court (new)			16,996.37	20,345.51	16,996.37	20,345.51
District attorney			8,988.11	11,077.75	8,988.11	11,077.75
Canal Zone marshal			7,996.16	9,684.13	7,996.16	9,684.13
Division of revenues		61,949.29		196,019.21		257,968.50
Division of posts	70,664.79	573,551.72	71,847.83	918,271.91	142,512.62	1,491,823.63
Purchase of stamps	22,895.75	300,229.17			22,895.75	300,229.17
Division of customs			19,098.75	107,952.54	19,098.75	107,952.54
Division of lands and buildings			6,126.10	108,172.17	6,126.10	108,172.17
Division of estates			2,415.10	36,016.14	2,415.10	36,016.14
Police and prisons	10,301.17	80,018.91	193,531.56	2,719,055.42	203,832.73	2,799,074.33
Fire protection			74,334.21	966,645.25	74,334.21	966,645.25
Public schools	71,362.26	597,649.12			71,362.26	597,649.12
Construction of schoolhouses	35,955.87	134,051.84			35,955.87	134,051.84
Repairs of schoolhouses	2,292.88	26,424.88			2,292.88	26,424.88
Sanitation	15,000.00	89,924.15			15,000.00	89,924.15
Zone charity	2,340.00	18,176.90			2,340.00	18,176.90
Miscellaneous Zone public works	882.96	63,415.81	674.62	34,825.14	1,557.58	98,240.95
Treasurer of Canal Zone				52,944.05		52,944.05
Construction of buildings		29,524.22	35,068.28	549,595.17	35,068.28	579,119.39
Repairs of buildings	309.80	12,827.88	3,670.70	28,745.75	3,980.50	41,573.63
Survey of lands, Canal Zone				75,000.00		75,000.00
Miscellaneous contingent	976.29	17,478.37			976.29	17,478.37
Construction of roads and trails	12,903.44	484,982.80			12,903.44	484,982.80
Maintenance of roads and trails	30,911.47	159,219.76			30,911.47	159,219.76
Construction, waterworks and sewers	352.61	51,965.20			352.61	51,965.20
Maintenance, waterworks and sewers	1,404.31	13,504.02			1,404.31	13,504.02
Special attorney			9,206.03	9,206.03	9,206.03	9,206.03
Total	288,887.60	2,811,420.53	458,845.44	6,945,412.46	747,733.04	9,756,832.99

TABLE NO. 52.—*Detailed statement of classified expenditures in health department for the fiscal year 1915, and from the beginning of the work to date.*

	Fiscal year 1915.	Total to June 30, 1914.	Grand total.
Health department:			
Administration	[1] $10,504.08	$888,719.22	$899,223.30
Hospitals and asylums—			
Medical storehouse, Colon	4,257.10	48,536.77	52,793.87
Ancon hospital	182,964.53	4,011,177.26	4,194,141.79
Colon hospital	29,884.43	1,965,410.32	1,995,294.75
Taboga sanitarium	....	131,428.43	131,428.43
Santo Tomas hospital	11,131.87	72,447.82	83,579.69
Other hospitals, dispensaries, and sick camps	62,033.53	2,185,540.34	2,247,573.87
Quarantine	32,681.09	407,668.64	440,349.73
Sanitation, Panama and Colon—			
Sanitation proper, Panama	34,450.49	846,537.77	880,988.26
Disposal of garbage, street cleaning, etc., Panama	12,979.14	92,957.69	105,936.83
Sanitation proper, Colon	23,204.79	635,430.85	658,635.64
Disposal of garbage, street cleaning, etc., Colon	10,508.33	47,671.15	58,179.48
Zone sanitation—			
Sanitation proper	113,454.00	4,246,233.93	4,359,687.93
Disposal of garbage, street cleaning, etc	16,804.87	537,004.86	553,809.73
Construction of buildings	(2)	1,037,745.06	1,037,745.06
Repairs of buildings	14,867.94	110,726.46	125,594.40
Corozal farm	12,498.50	15,798.43	28,296.93
Total	572,224.69	17,281,035.00	17,853,259.69

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[1] "Administration" was prorated to other units of health department after December, 1914.

[2] Construction of health department buildings was charged to "Buildings" this year.

TABLE NO. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
ANCON HOSPITAL.									
Division expense					$1,458.94			$1,604.47	
Superintendent's office		$3,463.66			1,295.41			1,072.25	
Admitting office					371.77			322.82	
Chaplains					244.25			226.70	
Hospital cars and ambulances					504.46			498.10	
Quartermaster's department		537.22			965.04			1,152.37	
Repairs to buildings		644.52			150.76				
Laboratory		2,283.09							
Operation of drug store		1,331.16			1,415.47			970.69	
Total general expense		8,259.65			6,406.10			5,847.40	
Kitchen		6,558.07			1,202.62			1,361.92	
Gold mess.......rations	2,584	2,648.50	$1.0250	2,142	2,154.64	$1.0060	2,545	2,311.77	$0.9084
Silver mess.........do	5,390	1,246.90	.2313	4,407	758.79	.1722	4,879	786.89	.1613
Repairs to buildings					305.78			223.36	
Bakery, loaves..pounds				28,429	774.51	.0272	18,672	866.73	.0462
Steam plant		200.97			187.14			545.16	
Laboratory					2,322.25				
Operating room, surgical:									
Direct expense, operations	236	1,744.59	7.3923	221	1,294.61	5.8579	256	1,459.49	5.7011
General expense, operations	236	719.35	3.0481	221	544.28	2.4628	256	477.04	1.8634
Total..operations	236	2,463.94	10.4404	221	1,838.89	8.3207	256	1,936.53	7.5645
Operating room, eye and ear:									
Direct expense, operations	81	433.12	5.3472	69	326.07	4.7256	61	236.76	3.8813
General expense, operations	81	200.00	2.4691	69	130.91	1.8972	61	93.04	1.5252
Total..operations	81	633.12	7.8163	69	456.98	6.6228	61	329.80	5.4065
Section A, white, surgical:									
Direct expense, patient days	2,863	2,229.21	.7786	2,700	2,222.69	.8232	2,292	2,404.39	1.0490
Subsistence, patient days	2,863	1,180.81	.4124	2,700	1,437.04	.5322	2,292	1,177.14	.5136
General expense, patient days	2,863	909.47	.3177	2,700	809.52	.2998	2,292	836.22	.3648
Total..patient days	2,863	4,319.49	1.5087	2,700	4,469.25	1.6552	2,292	4,417.75	1.9274
Section B, black, surgical:									
Direct expense, patient days	3,817	1,722.01	.4511	3,093	1,255.52	.4059	3,709	1,558.96	.4203
Subsistence, patient days	3,817	791.61	.2074	3,093	686.99	.2221	3,709	709.05	.1912
General expense, patient days	3,817	587.00	.1538	3,093	532.07	.1720	3,709	621.07	.1674
Total..patient days	3,817	3,100.62	.8123	3,093	2,474.58	.8000	3,709	2,889.08	.7789
Section C, white, medical:									
Direct expense, patient days	576	1,509.28	2.6203	486	1,329.61	2.7358	550	1,319.32	2.3987
Subsistence, patient days	576	271.04	.4705	486	332.59	.6843	550	397.02	.7219
General expense, patient days	576	632.05	1.0973	486	370.55	.7625	550	407.96	.7417
Total..patient days	576	2,412.37	4.1881	486	2,032.75	4.1826	550	2,124.30	3.8623
Section D, black, eye and ear:									
Direct expense, patient days	414	343.31	.8293	607	685.30	1.1288	600	529.06	.8817
Subsistence, patient days	414	85.86	.2074	607	134.83	.2221	600	174.01	.2900

department, January to June, 1915, inclusive.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
......	$1,277.67	......	......	$1,437.61	......	......	$1,335.11	......	......	$7,113.80	......
......	1,512.76	......	......	1,055.89	......	......	1,155.41	......	......	9,555.38	......
......	310.65	......	......	291.49	......	......	312.95	......	......	1,609.68	......
......	168.07	......	......	234.52	......	......	216.93	......	......	1,090.47	......
......	509.20	......	......	505.90	......	......	507.25	......	......	2,524.91	......
......	856.28	......	......	1,096.95	......	......	877.18	......	......	5,485.04	......
......	......	......	......	337.74	......	......	233.93	......	......	1,366.95	......
......	......	......	......	......	......	......	......	......	......	2,283.09	......
......	1,066.83	......	......	826.11	......	......	775.22	......	......	6,385.48	......
......	5,701.46	......	......	5,786.21	......	......	5,413.98	......	......	37,414.80	......
......	1,333.16	......	......	1,258.19	......	......	845.03	......	......	12,558.99	......
2,444	2,383.26	$0.9751	2,493	2,479.04	$0.9944	2,374	2,406.10	$1.0135	14,582	14,374 31	$0.9858
4,596	808.74	.1760	4,763	900.83	.1891	4,618	792.46	.1716	28,653	5,294.61	.1847
......	545.64	......	......	736.88	......	......	427.80	......	......	2,690.05	......
19,358	861.42	.0445	20,195	764.11	.0378	19,746	806.62	.0408	......	4,043.39	......
......	255.13	......	......	325.38	......	......	71.93	......	......	1,591.71	......
......	......	......	......	......	......	......	......	......	......	2,322.25	......
228	1,942.42	8.5194	298	1,624.78	5.4523	269	1,288.13	4.7886	1,508	9,354.02	6.2029
228	543.67	2.3845	298	597.10	2.0037	269	498.59	1.8535	1,508	3,380.03	2.2415
228	2,486.09	10.9039	298	2,221.88	7.4560	269	1,786.72	6.6421	1,508	12,734.05	8.4444
44	300.11	6.8207	28	266.23	9.5082	34	225.57	6.6344	318	1,787.86	5.6222
44	98.14	2.2304	28	99.81	3.5546	34	86.41	2.5415	318	708.31	2.2274
44	398.25	9.0511	28	366.04	13.0628	34	311.98	9.1759	318	2,496.17	7.8496
2,174	1,958.40	.9008	2,860	1,793.55	.6271	2,683	1,896.25	.7068	15,572	12,504.49	.8030
2,174	1,209.69	.5564	2,860	1,770.29	.6190	2,683	1,354.49	.5048	15,572	8,129.46	.5221
2,174	869.29	.3999	2,860	723.69	.2530	2,683	746.74	.2783	15,572	4,894.93	.3144
2,174	4,037.38	1.8571	2,860	4,287.53	1.4991	2,683	3,997.48	1.4899	15,572	25,528.88	1.6395
3,573	1,237.66	.3464	3,696	1,087.11	.2941	3,512	1,111.68	.3165	21,400	7,972.94	.3726
3,573	718.87	.2012	3,696	711.45	.1925	3,512	642.70	.1830	21,400	4,260.67	.1991
3,573	542.83	.1519	3,696	495.47	.1341	3,512	484.99	.1381	21,400	3,263.43	.1525
3,573	2,499.36	.6995	3,696	2,294.03	.6207	3,512	2,239.37	.6376	21,400	15,497.04	.7242
494	1,425.92	2.8865	510	1,271.64	2.4934	539	1,186.34	2.2010	3,155	8,042.11	2.5490
494	360.34	.7294	510	431.50	.8461	539	395.84	.7344	3,155	2,188.33	.6936
494	442.04	.8948	510	462.12	.9061	539	422.89	.7846	3,155	2,737.61	.8677
494	2,228.30	4.5107	510	2,165.26	4.2456	539	2,005.07	3.7200	3,155	12,968.05	4.1103
576	520.88	.9043	477	394.77	.8242	461	396.42	.8599	3,135	2,869.74	.9154
576	174.84	.3035	477	91.81	.1917	461	84.37	.1830	3,135	745.72	.2379

TABLE NO. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
ANCON HOSPITAL—contd.									
Section D, black, eye and ear—Continued.									
General expense, patient days	414	$132.05	$0.3189	607	$197.75	$0.3258	600	$166.88	$0.2781
Total..patient days	414	561.22	1.3556	607	1,017.88	1.6767	600	869.95	1.4498
Section D, white, eye and ear:									
Direct expense, patient days	713	591.21	.8292	367	414.30	1.1289	528	465.52	.8818
Subsistence, patient days	713	294.07	.4124	367	245.53	.6690	528	258.50	.4896
General expense, patient days	713	227.43	.3190	367	119.57	.3258	528	146.84	.2781
Total..patient days	713	1,112.71	1.5606	367	779.40	2.1237	528	870.96	1.6495
Section E, black, female:									
Direct expense, patient days	1,319	1,051.84	.7975	952	917.03	.9632	1,324	825.24	.6233
Subsistence, patient days	1,319	380.75	.2886	952	300.82	.3160	1,324	328.05	.2478
General expense, patient days	1,319	410.93	.3115	952	289.45	.3040	1,324	265.17	.2002
Total, patient days	1,319	1,843.52	1.3976	952	1,507.30	1.5832	1,324	1,418.46	1.0713
Section F, black, male, medical:									
Direct expense, patient days	2,671	1,622.10	.6073	2,550	1,611.02	.6318	2,623	1,616.73	.6164
Subsistence, patient days	2,671	553.92	.2074	2,550	566.45	.2222	2,623	738.78	.2816
General expense, patient days	2,671	644.78	.2414	2,550	572.59	.2245	2,623	563.36	.2148
Total, patient days	2,671	2,820.80	1.0561	2,550	2,750.06	1.0785	2,623	2,918.87	1.1128
Section F, white, male, medical:									
Direct expense, patient days	1,317	799.82	.6073	1,000	912.94	.9129	947	768.74	.8117
Subsistence, patient days	1,317	543.18	.4124	1,000	723.73	.7237	947	455.67	.4811
General expense, patient days	1,317	317.92	.2414	1,000	305.69	.3057	947	252.38	.2665
Total, patient days	1,317	1,660.92	1.2611	1,000	1,942.36	1.9423	947	1,476.79	1.5593
Section G, white, female, wards:									
Direct expense, patient days	1,329	2,412.37	1.8152	458	1,060.56	2,3156	541	891.14	1.6472
Subsistence, patient days	1,329	784.77	.5905	458	317.31	.6928	541	370.79	.6853
General expense, patient days	1,329	866.96	.6523	458	293.36	.6405	541	266.65	.4929
Total, patient days	1,329	4,064.10	3.0580	458	1,671.23	3.6489	541	1,528.58	2.8254
Section G, white, female, private rooms:									
Direct expense, patient days	....	....	....	250	891.11	3.5644	351	793.57	2.2608
Subsistence, patient days	....	....	....	250	173.20	.6928	351	240.56	.6853
General expense, patient days	....	....	....	250	248.50	.9940	351	232.76	.6631
Total, patient days	....	....	....	250	1,312.81	5.2512	351	1,266.89	3.6092

department, January to June, 1915, inclusive—Continued.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
576	$171.49	$0.2977	477	$152.46	$0.3183	461	$157.55	$0.3418	3,135	$978.18	$0.3120
576	867.21	1.5055	477	639.04	1 3342	461	638.34	1.3847	3,135	4,593.64	1.4653
458	414.16	.9043	514	452.64	.8806	728	654.57	.8991	3,308	2,992.50	.9046
458	238.19	.5200	514	373.44	.7265	728	416.72	.5724	3,308	1,826.45	.5521
458	136.34	.2977	514	159.85	.3110	728	236.72	.3252	3,308	1,026.75	.3104
458	788.69	1.7220	514	985.93	1.9181	728	1,308.01	1.7967	3,308	5,845.70	1.7671
1,274	1,004.34	.7883	959	963.62	1.0048	1,481	1,060.06	.7158	7,309	5,822.13	.7966
1,274	339.30	.2663	959	257.35	.2684	1,481	362.15	.2445	7,309	1,968.42	.2693
1,274	329.53	.2586	959	398.98	.4160	1,481	358.35	.2420	7,309	2,052.41	.2808
1,274	1,673 17	1.3132	959	1,619.95	1.6892	1,481	1,780.56	1.2023	7,309	9,842.96	1.3467
2,472	1,500.26	.6069	3,081	1,565.64	.5082	3,524	1,705.91	.4841	16,921	9,621.66	.5686
2,472	720.67	.2915	3,081	593.07	.1925	3,524	644.91	.1830	16,921	3,817.88	.2256
2,472	526.29	.2129	3,081	640.94	.2080	3,524	651.99	.1850	16,921	3,599.95	.2128
2,472	2,747.22	1.1113	3,081	2,799.65	.9087	3,524	3,002.89	.8521	16,921	17,039.49	1.0070
1,102	864.22	.7842	1,141	1,079.05	.9457	1,448	925.01	.6388	6,955	5,349.78	.7692
1,102	559.64	.5078	1,141	948.16	.8310	1,448	991.12	.6845	6,955	4,221.50	.6070
1,102	314.32	.2852	1,141	410.43	.3597	1,448	336.39	.2323	6,955	1,937.13	.2785
1,102	1,738.18	1.5772	1,141	2,437.64	2.1364	1,448	2,252.52	1 5556	6,955	11,508.41	1.6547
377	852.01	2.2600	458	954.83	2.0848	368	912.94	2.4808	3,531	7,083.85	2.0062
377	283.72	.7525	458	388.11	.8474	368	281.00	.7636	3,531	2,425.70	.6870
377	270.21	.7167	458	317.24	.6927	368	311.84	.8474	3,531	2,326.26	.6588
377	1,405.94	3.7292	458	1,660.18	3.6249	368	1,505.78	4.0918	3,531	11,835.81	3.3520
276	695.03	2.5182	172	722.96	4.2033	266	662.55	2.4908	1,315	3,765.22	2.8633
276	207.75	.7527	172	145.76	.8474	266	203.11	.7636	1,315	970.38	.7379
276	220.54	.7991	172	245.18	1.4255	266	226.06	.8498	1,315	1,173.04	8920
276	1,123.32	4.0700	172	1,113.90	6.4762	266	1,091.72	4.1042	1,315	5,908.64	4.4932

Table No. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
ANCON HOSPITAL—contd.									
Section G, white, nursery:									
Direct expense, patient days				152	$358.15	$2.3562	217	$374.96	$1.7279
General expense, patient days				152	101.18	.6657	217	111.96	.5159
Total, patient days				152	459.33	3.0219	217	486.92	2.2438
Ward 5, chronic patients:									
Direct expense, patient days	769	$54.59	$0.0710	774	68.58	.0886	922	83.73	.0908
Subsistence, patient days	769	159.48	.2074	774	147.80	.1909	922	153.86	.1668
General expense, patient days	769	16.87	.0219	774	12.78	.0165	922	17.47	.0189
Total, patient days	769	230.94	.3003	774	229.16	.2960	922	255.06	.2765
Ward 17, isolation:									
Direct expense, patient days	957	731.74	.7646	910	660.54	.7258	951	687.74	.7232
Subsistence, patient days	957	394.75	.4125	910	428.94	.4713	951	435.19	.4576
General expense, patient days	957	268.74	.2808	910	250.02	.2747	951	237.53	.2497
Total, patient days	957	1,395.23	1.4579	910	1,339.50	1.4718	951	1,360.46	1.4305
Out-patient department:									
Ancon dispensary—									
Direct expense					564.89			724.86	
General expense					407.56			353.40	
Total					972.45			1,078.26	
Clinics—									
Direct expense		1,050.88			532.77			539.63	
General expense		795.98			193.21			181.01	
Total		1,846.86			725.98			720.64	
Undertaking:									
Direct expense		677.55			664.38			688.48	
General expense		106.39			83.25			80.14	
Total		783.94			747.63			768.62	
Gold mess, boarders, rations	708	710.31	1.0032	656	659.95	1.0060	854	773.11	.9084
Silver mess, boarders, rations	31	6.98	.2251	28	4.82	.1722	31	4.93	.1613
Physical examination of employees		312.25							
Asylum:									
Direct expense, patient days	8,356	2,977.28	.3563	7,440	2,907.91	.3908	8,070	2,843.08	.3523
Subsistence, patient days	8,356	1,733.50	.2074	7,440	1,553.46	.2089	8,070	1,913.65	.2371
General expense, patient days	8,356	1,083.94	.1297	7,440	851.39	.1144	8.070	801.19	.0993
Total, patient days	8,356	5,794.72	.6934	7,440	5,312.76	.7141	8.070	5,557.92	.6887
Total departmental expenses		36,074.04			35,027.32			33,053.88	
Fluctuations in stock on hand		[1] 18.80			[1] 1,462.22			[1] 2,597.72	
Total expenses, Ancon Hospital		36,055.24			33,565.10			30,456.16	

[1] Indicates credit.

department, January to June, 1915, inclusive—Continued.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
135	$395.30	$2.9281	161	$307.73	$1.9114	69	$206.28	$2.9896	734	$1,642.42	$2.2376
135	123.94	.9180	161	104.73	.6505	69	75.35	1.0920	734	517.16	.7046
135	519.24	3.8461	161	412.46	2.5619	69	281.63	4.0816	734	2,159.58	2.9422
823	54.83	.0666	841	116.10	.1380	801	95.87	.1197	4,929	473.70	.0961
823	151.14	.1837	841	152.88	.1818	801	136.97	.1710	4,929	902.13	.1830
823	13.74	.0166	841	15.99	.0190	801	16.09	.0201	4,929	92.94	.0189
823	219.71	.2669	841	284.97	.3388	801	248.93	.3108	4,929	1,468.77	.2980
568	595.40	1.0482	270	432.44	1.6016	292	246.71	.8449	3,948	3,354.57	.8497
568	294.77	.5189	270	176.56	.6539	292	179.09	.6133	3,948	1,909.30	.4836
568	217.45	.3829	270	170.76	.6325	292	95.61	.3274	3,948	1,240.11	.3141
568	1,107.62	1.9500	270	779.76	2.8880	292	521.41	1.7856	3,948	6,503.98	1.6474
....	718.67	....	....	664.24	....	....	832.50	....	....	3,505.16	....
....	379.43	....	....	354.84	....	....	315.75	....	....	1,810.98	....
....	1,098.10	....	....	1,019.08	....	....	1,148.25	....	....	5,316.14	....
....	714.31	....	....	535.93	....	....	556.88	....	....	3,930.40	....
....	276.44	....	....	242.00	....	....	247.41	....	....	1,936.05	....
....	990.75	....	....	777.93	....	....	804.29	....	....	5,866.45	....
....	396.59	....	....	279.58	....	....	843.23	....	....	3,549.81	....
....	77.57	....	....	66.56	....	....	85.23	....	....	499.14	....
....	474.16	....	....	346.14	....	....	928.46	....	....	4,048.95	....
871	849.32	.9751	898	892.98	.9944	871	882.77	1.0135	4,858	4,768.44	.9816
37	6.51	.1760	31	5.87	.1891	73	12.53	.1716	221	41.64	.1884
....	....	....	....	....	....	....	....	....	....	312.25	....
....	....	....	....	....	....	....	....	....	23,866	8,728.27	.3657
....	....	....	....	....	....	....	....	....	23,866	5,200.61	.2179
....	....	....	....	....	....	....	....	....	23,866	2,736.52	.1147
....	....	....	....	....	....	....	....	....	23,866	16,665.40	.6983
....	27,258.52	....	....	27,110.22	....	....	26,748.71	....	....	185,272.69	....
....	735.96	....	....	1,563.58	....	....	80.27	....	....	[1] 1,698.93	....
....	27,994.48	....	....	28,673.80	....	....	26,828.98	....	....	183,573.76	....

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[1] Indicates credit.

TABLE NO. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
COLON HOSPITAL.									
Division expense	......	......	......	......	......	......	......	$242.53	......
Superintendent's office	......	......	......	......	......	......	......	340.12	......
Ambulance	......	......	......	......	......	......	......	109.00	......
Linen room	......	......	......	......	......	......	......	90.50	......
Repairs to buildings	......	......	......	......	......	......	......	......	......
Kitchen	......	......	......	......	......	......	......	1,012.48	......
Total general expense	......	......	......	......	......	......	......	1,794.63	......
Direct expense, patient days	1,139	$4,323.79	$3.7961	921	$2,920.18	$3.1706	......	......	......
General expense, patient days	1,139	52.11	.0457	921	24.33	.0264	......	......	......
Total, patient, days	1,139	4,375.90	3.8418	921	2,944.51	3.1970	......	......	......
Dispensary:									
Direct expense	......	......	......	......	......	......	......	777.03	......
General expense	......	......	......	......	......	......	......	291.97	......
Total	......	......	......	......	......	......	......	1,069.00	......
Operating room:									
Direct expense, operations	......	......	......	......	......	......	40	246.32	$6.1580
General expense, operations	......	......	......	......	......	......	40	82.35	2.0587
Total, operations	......	......	......	......	......	......	40	328.67	8.2167
Ward treatment, white:									
Direct expense, patient days	......	......	......	......	......	......	488	559.41	1.1463
Subsistence, patient days	......	......	......	......	......	......	488	397.95	.8155
General expense, patient days	......	......	......	......	......	......	488	169.82	.3480
Total, patient days	......	......	......	......	......	......	488	1,127.18	2.3098
Ward treatment, black:									
Direct expense, patient days	......	......	......	......	......	......	684	781.29	1.1422
Subsistence, patient days	......	......	......	......	......	......	684	223.11	.3262
General expense, patient days	......	......	......	......	......	......	684	238.01	.3480
Total, patient days	......	......	......	......	......	......	684	1,242.41	1.8164
Total, ward treatment, patient days	......	......	......	......	......	......	1,172	2,369.59	2.0218
Gold mess, boarders, rations	......	......	......	......	......	......	64	52.84	.8155
Total departmental expenses	......	4,375.90	......	......	2,944.51	......	......	3,820.10	......
Fluctuations in stock on hand	......	......	......	......	......	......	......	[1] 38.54	......
Total expenses, Colon Hospital	......	4,375.90	......	......	2,944.51	......	......	3,781.56	......
LINE HOSPITALS AND DISPENSARIES.									
Naos Island	......	86.73	......	......	63.87	......	......	94.39	......
Balboa	......	1,133.65	......	......	1,099.83	......	......	1,076.85	......
Corozal	......	640.20	......	......	578.51	......	......	825.14	......
Pedro Miguel	......	477.05	......	......	475.65	......	......	496.78	......

[1] Indicates credit.

department, January to June, 1915, inclusive—Continued.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
......	$170.16	......	......	$184.99	......	......	$179.34	......	......	$777.02	......
......	949.71	......	......	617.89	......	......	617.89	......	......	2,525.61	......
......	117.62	......	......	122.71	......	......	117.16	......	......	466.49	......
......	91.34	......	......	163.53	......	......	88.12	......	......	433.49	......
......	......	......	......	249.73	......	......	119.08	......	......	368.81	......
......	877.72	......	......	913.96	......	......	895.77	......	......	3,699.93	......
......	2,206.55	......	......	2,252.81	......	......	2,017.36	......	......	8,271.35	......
......	......	......	......	......	......	......	......	......	2,060	7,243.97	$3.5165
......	......	......	......	......	......	......	......	......	2,060	76.44	.0371
......	......	......	......	......	......	......	......	......	2,060	7,320.41	3.5536
......	564.56	......	......	582.81	......	......	498.42	......	......	2,422.82	......
......	412.88	......	......	466.40	......	......	351.09	......	......	1,522.34	......
......	977.44	......	......	1,049.21	......	......	849.51	......	......	3,945.16	......
27	198.47	$7.3507	44	257.93	$5.8620	44	244.33	$5.5530	155	947.05	6.1100
27	165.04	6.1126	44	181.65	4.1284	44	178.84	4.0645	155	607.88	3.9216
27	363.51	13.4633	44	439.58	9.9904	44	423.17	9.6175	155	1,554.93	10.0316
412	365.24	.8865	439	356.52	.8121	510	390.38	.7654	1,849	1,671.55	.9040
412	392.29	.9522	439	387.12	.8818	510	403.16	.7906	1,849	1,580.52	.8547
412	286.46	.6953	439	274.45	.6252	510	314.60	.6168	1,849	1,045.33	.5653
412	1,043.99	2.5340	439	1,018.09	2.3191	510	1,108.14	2.1728	1,849	4,297.40	2.3240
668	592.19	.8865	666	540.87	.8121	666	509.80	.7654	2,684	2,424.15	.9032
668	172.64	.2584	666	180.12	.2705	666	181.28	.2722	2,684	757.15	.2821
668	464.45	.6953	666	416.35	.6251	666	410.84	.6168	2,684	1,529.65	.5699
668	1,229.28	1.8402	666	1,137.34	1.7077	666	1,101.92	1.6544	2,684	4,710.95	1.7552
1,080	2,273.27	2.1049	1,105	2,155.43	1.9506	1,176	2,210.06	1.8793	4,533	9,008.35	1.9873
35	33.33	.9523	72	63.49	.8818	71	56.13	.7906	242	205.79	.8503
......	3,647.55	......	......	3,707.71	......	......	3,538.87	......	......	22,034.64	......
......	73.62	......	......	[1] 107.95	......	......	39.18	......	......	[1] 33.69	......
......	3,721.17	......	......	3,599.76	......	......	3,578.05	......	......	22,000.95	......
......	124.43	......	......	191.33	......	......	178.62	......	......	739.37	......
......	933.23	......	......	1,278.55	......	......	1,050.21	......	......	6,572.32	......
......	648.96	......	......	645.37	......	......	697.66	......	......	4,035.84	......
......	476.86	......	......	542.72	......	......	548.43	......	......	3,017.49	......

TABLE No. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
LINE HOSPITALS AND DISPENSARIES—contd.									
Paraiso		$534.05			$583.51			$596.18	
Culebra		457.91			457.63				
Gamboa		144.67			136.19			138.78	
Gatun		507.80			523.38			551.98	
Toro Point		36.40			13.85				
Marguerita Point		44.05							
District dentists		12.00			15.72			15.88	
Direct expense		4,074.51			3,948.14			3,795.98	
Division expense		79.96			659.56			347.31	
Total		4,154.47			4,607.70			4,143.29	
PALO SECO LEPER ASYLUM.									
Direct expense, patient days	1,540	1,311.59	$0.8517	1,383	1,906.95	$1.3788	1,550	2,044.54	$1.3191
Division expense, patient days	1,540	14.90	.0097	1,383	24.93	.0180	1,550	39.98	.0257
Total	1,540	1,326.49	.8614	1,383	1,931.88	1.3968	1,550	2,084.52	1.3448
SANITATION PROPER, CANAL ZONE.									
Balboa		681.44			557.30			643.81	
Ancon		1,994.93			1,907.96			849.36	
Corozal		1,738.34			1,677.09			900.66	
Pedro Miguel		776.38			787.83			696.32	
Paraiso		838.49			1,001.18			756.18	
Culebra		371.04			810.59			315.45	
Frijoles		121.99			123.01			111.50	
Gatun		925.02			819.84			899.31	
Cristobal, Mount Hope		971.11			886.29			1,036.25	
Direct expense		8,418.74			8,571.09			6,208.84	
Division expense		124.06			56.61			280.50	
Total		8,542.80			8,627.70			6,489.34	
Fluctuations in stock on hand		[1] 114.96			[1] 91.82			601.21	
Total		8,427.84			8,535.88			7,090.55	
GARBAGE DISPOSAL, ETC., CANAL ZONE.									
Balboa		435.22			544.93			423.01	
Ancon		422.64			412.35			290.37	
Corozal		456.62			421.00			132.86	
Pedro Miguel		207.75			188.55			105.00	
Paraiso		255.10			242.55			77.51	
Culebra		335.79			290.18			87.50	
Gatun		487.30			460.77			373.12	
Cristobal, Mount Hope		422.65			381.58			368.45	
Direct expense		3,023.07			2,941.91			1,857.82	
Less charges to Canal Zone government		1,500.00			1,500.00			1,500.00	
Total		1,523.07			1,441.91			357.82	
Division expense		5.13			2.03			9.31	
Total		1,528.20			1,443.94			367.13	
COROZAL FARM.									
Kitchen									
Silver mess......rations									
Sewing room									
Laundry									

department, January to June, 1915, inclusive—Continued.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
	$535.88			$584.12			$641.51			$3,475.25	
	134.51			23.77			1.90			1,075.72	
	142.77			148.02			140.68			851.11	
	596.43			613.38			744.09			3,537.06	
	18.20			28.80						97.25	
										44.05	
	5.88			6.80			6.98			63.26	
	3,617.15			4,062.86			4,010.08			23,508.72	
	324.32			420.90			357.36			2,189.41	
	3,941.47			4,483.76			4,367.44			25,698.13	
1,510	1,828.97	$1.2112	1,581	2,076.56	$1.3134	1,632	2,463.56	$1.5095	9,196	11,632.17	$1.2649
1,510	35.18	.0233	1,581	68.89	.0436	1,632	63.65	.0390	9,196	247.53	.0226
1,510	1,864.15	1.2345	1,581	2,145.45	1.3570	1,632	2,527.21	1.5485	9,196	11,879.70	1.2875
	617.47			1,578.95			2,909.40			6,988.37	
	714.09			1,726.05			1,525.58			8,717.97	
	1,315.70			1,030.92			1,666.81			8,329.52	
	1,906.16			4,055.47			2,103.00			10,325.16	
										2,595.85	
	292.34			86.78			242.10			2,118.30	
	99.77			67.88			100.41			624.56	
	925.42			965.76			1,950.69			6,486.04	
	1,360.58			1,289.82			1,683.32			7,227.37	
	7,231.53			10,801.63			12,181.31			53,413.14	
	253.19			354.06			352.63			1,421.05	
	7,484.72			11,155.69			12,533.94			54,834.19	
	379.19			[1] 1,000.21			[1] 891.36			[1] 1,117.95	
	7,863.91			10,155.48			11,642.58			53,716.24	
				19.87						1,423.03	
	43.75			2.42						1,171.53	
										1,010.48	
	83.64			93.06			90.53			768.53	
										575.16	
	65.36			129.51			139.16			1,047.50	
	239.59			240.54			237.50			2,038.82	
	161.82			271.34			280.43			1,886.27	
	594.16			756.74			747.62			9,921.32	
										4,500.00	
	594.16			756.74			747.62			5,421.32	
	9.12			8.50			12.25			46.34	
	603.28			765.24			759.87			5,467.66	
	2,264.63			2,103.31			1,984.64			6,352.58	
1,928	724.68	.3759	2,067	662.16	.3203	1,917	620.24	.3235	5,912	2,007.08	.3395
	327.32			470.37			237.25			1,034.94	
				70.75			35.12			105.87	

Table No. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
COROZAL FARM—contd.									
Care of insane:									
Direct expenses, patient days	......	......	......	......	......	......	......	......	......
Subsistence, patient days	......	......	......	......	......	......	......	......	......
Total, patient days	......	......	......	......	......	......	......	......	......
Operation of farm:									
Farm	......	$1,349.00	......	......	$1,260.97	......	......	$904.08	......
Dairy..quarts milk	......	......	......	......	......	......	6,994	886.67	$0.1267
Poultry .dozen eggs	......	......	......	......	......	......	434	114.52	.3333
Piggery	......	......	......	......	......	......	......	149.97	......
Care of cemetery	......	......	......	......	......	......	......	14.49	......
Total	......	1,349.00	......	......	1,260.97	......	......	2,069.73	......
Superintendent's office	......	......	......	......	......	......	......	......	......
Division expense	......	23.44	......	......	10.65	......	......	54.18	......
Total operation of Corozal farm	......	1,372.44	......	......	1,271.62	......	......	2,123.91	......
Credits:									
Produce transferred to Ancon hospital	......	151.25	......	......	238.55	......	......	95.66	......
Produce transferred to commissary department	......	......	......	......	......	......	......	......	......
Produce transferred to outsiders	......	......	......	......	......	......	......	......	......
Total credits	......	151.25	......	......	238.55	......	......	95.66	......
Fluctuations in stock on hand	......	......	......	......	......	......	......	1,048.03	......
Net expenses, Corozal farm	......	1,221.19	......	......	1,033.07	......	......	3,076.28	......
QUARANTINE.									
Chief quarantine office:									
Direct expense	......	......	......	......	......	......	......	......	......
Division expense	......	......	......	......	......	......	......	159.12	......
Total	......	......	......	......	......	......	......	159.12	......
Quarantine proper, Balboa:									
Direct expense	......	......	......	......	......	......	......	720.76	......
General expense	......	......	......	......	......	......	......	36.75	......
Total	......	......	......	......	......	......	......	757.51	......
Maintenance of passengers, Balboa:									
Direct expense..days	......	......	......	......	......	......	752	1,008.24	1.3407
General expense, days	......	......	......	......	......	......	752	37.05	.0492
Total........days	......	......	......	......	......	......	752	1,045.29	1.3899
Quarantine, proper, Colon:									
Direct expense	......	......	......	......	......	......	......	852.16	......
General expense	......	......	......	......	......	......	......	45.61	......
Total	......	......	......	......	......	......	......	897.77	......

department, January to June, 1915, inclusive—Continued.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
7,817	$2,849.79	$0.3965	7,899	$2,254.95	$0.2855	7,668	$2,113.23	$0.2756	23,384	$7,217.97	$0.3087
7,817	1,539.95	.2143	7,899	1,399.13	.1771	7,668	1,286.14	.1677	23,384	4,225.22	.1807
7,817	4,389.71	.6108	7,899	3,654.08	.4626	7,668	3,399.37	.4433	23,384	11,443.19	.4894
......	849.80	......	......	714.23	......	......	609.14	......	......	5,687.22	......
5,116	796.55	.1557	5,593	906.84	.1621	6,678	910.89	.1364	24,381	3,500.95	.1436
341	131.39	.3853	364	117.01	.3214	313	128.37	.4101	1,451	491.29	.3386
......	102.65	......	......	84.37	......	......	130.17	......	......	467.16	......
......	21.55	......	......	32.15	......	......	84.22	......	......	152.41	......
......	1,901.94	......	......	1,854.60	......	......	1,862.79	......	......	10,299.03	......
......	32.11	......	......	220.64	......	......	183.56	......	......	436.31	......
......	248.89	......	......	298.14	......	......	180.07	......	......	815.37	......
......	6,572.68	......	......	6,027.46	......	......	5,625.79	......	......	22,993.90	......
......	1,068.09	......	......	1,119.44	......	......	1,097.60	......	......	3,770.59	......
......	147.38	......	......	114.74	......	......	108.36	......	......	370.48	......
......	366.70	......	......	279.56	......	......	405.33	......	......	1,051.59	......
......	1,582.17	......	......	1,513.74	......	......	1,611.29	......	......	5,192.66	......
......	[1]1,247.48	......	......	1,799.68	......	......	[1]556.20	......	......	1,044.03	......
......	3,743.03	......	......	6,313.40	......	......	3,458.30	......	......	18,845.27	......
......	439.73	......	......	221.20	......	......	181.75	......	......	842.68	......
......	149.48	......	......	189.42	......	......	192.18	......	......	690.20	......
......	589.21	......	......	410.62	......	......	373.93	......	......	1,532.88	......
......	724.17	......	......	1,237.35	......	......	798.01	......	......	3,480.29	......
......	107.46	......	......	67.31	......	......	73.34	......	......	284.86	......
......	831.63	......	......	1,304.66	......	......	871.35	......	......	3,765.15	......
306	923.79	3.0189	313	883.80	2.8236	355	1,090.73	3.0724	1,216	3,906.56	3.2126
306	132.18	.4320	313	86.57	.2766	355	73.35	.2066	1,216	329.15	.2707
306	1,055.97	3.4509	313	970.37	3.1002	355	1,164.08	3.2790	1,216	4,235.71	3.4833
......	1,145.31	......	......	1,257.60	......	......	1,402.23	......	......	4,657.30	......
......	199.24	......	......	165.79	......	......	147.63	......	......	558.27	......
......	1,344.55	......	......	1,423.39	......	......	1,549.86	......	......	5,215.57	......

[1] Indicates credit.

TABLE NO. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
QUARANTINE—contd.									
Maintenance of passengers, Colon:									
Direct expense..days..							989	$1,815.52	$1.8357
General expense, days							989	39.71	.0401
Total........days..							989	1,855.23	1.8758
Chief quarantine office...		$295.45			$117.26				
Quarantine, Balboa......		1,739.56			1,498.87				
Quarantine, Colon........		2,432.92			2,263.61				
Direct expense.....		4,467.93			3,879.74				
Division expense..........		70.96			45.74				
Total..............		4,538.89			3,925.48				
Total expenses, quarantine.......		4,538.89			3,925.48			4,555.80	
SANTO TOMAS HOSPITAL.									
Direct expense...........		891.18			857.37			629.49	
Division expense.........		21.73			[1] 21.73				
Total...............		912.91			835.64			629.49	
SANITATION, PROPER, PANAMA.									
Direct expense...........		3,069.78			2,613.55			2,908.43	
Division expense.........		62.52			29.75			126.47	
Total..............		3,132.30			2,643.30			3,034.90	
STREET CLEANING, GARBAGE DISPOSAL, PANAMA.									
Direct expense...........		4,484.13			4,171.71			4,301.94	
Division expense.........		93.68			41.03			198.32	
Total..............		4,577.81			4,212.74			4,500.26	
Less charge to Panama Government...........		3,166.66			3,166.67			3,166.66	
Total..............		1,411.15			1,046.07			1,333.60	
SANITATION, PROPER, COLON.									
Direct expense...........		1,921.41			1,786.33			1,717.07	
Division expense.........		48.88			65.67			103.94	
Total..............		1,970.29			1,852.00			1,821.01	
STREET CLEANING, GARBAGE DISPOSAL, COLON.									
Direct expense...........		1,888.96			1,811.71			2,020.39	
Division expense.........		34.57			15.83			83.02	
Total..............		1,923.53			1,827.54			2,103.41	
Less one-half charge to Panama Government..		961.77			913.77			1,051.71	
Total..............		961.76			913.77			1,051.70	
SUMMARY.									
Administration..........		1,164.59			479.44			484.01	
Board of health laboratory								1,791.56	
Operation of medical store		723.26			912.02			795.22	
Total division expense..................		1,887.85			1,391.46			3,070.79	

[1] Indicates credit.

department, January to June, 1915, inclusive—Continued.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
835	$1,514.24	$1.8135	771	$1,626.77	$2.1099	895	$1,487.01	$1.6614	3,488	$6,443.54	$1.8473
835	150.33	.1800	771	90.95	.1180	895	79.61	.0890	3,488	360.60	.1034
835	1,664.57	1.9935	771	1,717.72	2.2279	895	1,566.62	1.7504	3,488	6,804.14	1.9507
......	......	......	......	......	......	......	......	......	......	412.71	......
......	......	......	......	......	......	......	......	......	......	3,238.43	......
......	......	......	......	......	......	......	......	......	......	4,696.53	......
......	......	......	......	......	......	......	......	......	......	8,347.67	......
......	......	......	......	......	......	......	......	......	......	116.70	......
......	......	......	......	......	......	......	......	......	......	8,464.37	......
......	4,896.72	......	......	5,416.14	......	......	5,151.91	......	......	28,484.94	......
......	909.18	......	......	922.54	......	......	969.45	......	......	5,179.21	......
......	......	......	......	......	......	......	......	......	......	......	......
......	909.18	......	......	922.54	......	......	969.45	......	......	5,179.21	......
......	2,959.66	......	......	3,694.70	......	......	3,739.00	......	......	18,985.12	......
......	113.49	......	......	188.95	......	......	182.24	......	......	703.42	......
......	3,073.15	......	......	3,883.65	......	......	3,921.24	......	......	19,688.54	......
......	4,273.73	......	......	4,117.21	......	......	4,273.79	......	......	25,622.51	......
......	174.71	......	......	239.65	......	......	220.73	......	......	968.12	......
......	4,448.44	......	......	4,356.86	......	......	4,494.52	......	......	26,590.63	......
......	3,166.67	......	......	3,166.66	......	......	3,166.66	......	......	18,999.98	......
......	1,281.77	......	......	1,190.20	......	......	1,327.86	......	......	7,590.65	......
......	1,439.21	......	......	3,015.64	......	......	2,322.67	......	......	12,202.33	......
......	79.65	......	......	139.93	......	......	123.40	......	......	561.47	......
......	1,518.86	......	......	3,155.57	......	......	2,446.07	......	......	12,763.80	......
......	1,903.55	......	......	2,047.71	......	......	2,231.89	......	......	11,904.21	......
......	78.36	......	......	102.36	......	......	89.03	......	......	403.17	......
......	1,981.91	......	......	2,150.07	......	......	2,320.92	......	......	12,307.38	......
......	990.96	......	......	1,075.04	......	......	1,160.46	......	......	6,153.71	......
......	990.95	......	......	1,075.03	......	......	1,160.46	......	......	6,153.67	......
......	620.88	......	......	1,107.79	......	......	797.66	......	......	4,654.37	......
......	1,412.42	......	......	1,608.62	......	......	1,670.27	......	......	6,482.87	......
......	863.92	......	......	916.99	......	......	820.06	......	......	5,031.47	......
......	2,897.22	......	......	3,633.40	......	......	3,287.99	......	......	16,168.71	......

TABLE NO. 53.—*Panama Canal—Operations, health*

	January.			February.			March.		
	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
SUMMARY—continued.									
Ancon Hospital	......	$36,055.24	......	......	$33,565.10	......	......	$30,456.16	......
Colon Hospital	......	4,375.90	......	......	2,944.51	......	......	3,781.56	......
Line hospitals and dispensaries	......	4,154.47	......	......	4,607.70	......	......	4,143.29	......
Palo Seco leper asylum	......	1,326.49	......	......	1,931.88	......	......	2,084.52	......
Sanitation, proper, Canal Zone	......	8,427.84	......	......	8,535.88	......	......	7,090.55	......
Garbage disposal, etc., Canal Zone	......	1,528.20	......	......	1,443.94	......	......	367.13	......
Corozal farm	......	1,221.19	......	......	1,033.07	......	......	3,076.28	......
Quarantine	......	4,538.89	......	......	3,925.48	......	......	4,555.80	......
Santo Tomas Hospital	......	912.91	......	......	835.64	......	......	629.49	......
Sanitation, proper, Panama	......	3.132.30	......	......	2,643.30	......	......	3,034.90	......
Street cleaning, garbage disposal, Panama	......	1,411.15	......	......	1,046.07	......	......	1,333.60	......
Sanitation, proper, Colon	......	1,970.29	......	......	1,852.00	......	......	1,821.01	......
Street cleaning, garbage disposal, Colon	......	961.76	......	......	913.77	......	......	1,051.70	......
Repair of buildings	......	457.30	......	......	2,261.52	......	......	247.84	......
Total expenses, health department	......	70,473.93	......	......	67,539.86	......	......	63,673.83	......
Cost of services to outsiders	......	29,862.40	......	......	25,113.14	......	......	28,184.27	......
Net expenses, health department	......	40,611.53	......	......	42,426.72	......	......	35,489.56	......

department, January to June, 1915, inclusive—Continued.

April.			May.			June.			Total.		
Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.	Quantity.	Cost.	Unit cost.
....	$27,994.48	....	....	$28,673.80	....	....	$26,828.98	....	....	$183,573.76	....
....	3,721.17	....	....	3,599.76	....	....	3,578.05	....	....	22,000.95	....
....	3,941.47	....	....	4,483.76	....	....	4,367.44	....	....	25,698.13	....
....	1,864.15	....	....	2,145.45	....	....	2,527.21	....	....	11,879.70	....
....	7,863.91	....	....	10,155.48	....	....	11,642.58	....	....	53,716.21	....
....	603.28	....	....	765.24	....	....	759.87	....	....	5,467.66	....
....	3,743.03	....	....	6,313.40	....	....	3,458.30	....	....	18,845.27	....
....	4,896.72	....	....	5,416.14	....	....	5,151.91	....	....	28,484.94	....
....	909.18	....	....	922.54	....	....	969.45	....	....	5,179.21	....
....	3,073.15	....	....	3,883.65	....	....	3,921.24	....	....	19,688.54	....
....	1,281.77	....	....	1,190.20	....	....	1,327.86	....	....	7,590.65	....
....	1,518.86	....	....	3,155.57	....	....	2,446.07	....	....	12,763.80	....
....	990.95	....	....	1,075.03	....	....	1,160.46	....	....	6,153.67	....
....	....	....	....	....	....	....	....	....	....	2,966.66	....
....	62,402.12	....	....	71,780.02	....	....	68,139.42	....	....	404,009.18	....
....	30,024.99	....	....	29,595.30	....	....	30,886.59	....	....	173,666.69	....
....	32,377.13	....	....	42,184.72	....	....	37,252.83	....	....	230,342.49	....

TABLE NO. 54.—*Dredging excavation—Detailed cost per unit of work, by months, fiscal year 1915.*

ATLANTIC ENTRANCE—CONSTRUCTION.

Item.	July.		August.		September.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, pipe-line dredges	2,700	$0.5287	5,670	$0.0386	4,144	$0.1028	12,514	$0.1659
Repairs, pipe-line dredges	2,700	.3704	5,670	.0255	4,144	.1221	12,514	.1320
Operation, miscellaneous floating equipment	2,700	.0043	5,670	.0033	4,144	.0020	12,514	.0002
Repairs, miscellaneons floating equipment	2,700	[1].0001	5,670	.0009	4,144	.0008	12,514	.0006
Pipe lines	2,700	.0328	5,670		4,144	.0041	12,514	.0086
Channel lights	2,700	.0011	5,670	.0005	4,144	.0005	12,514	.0006
Division expense	2,700	.0072	5,670	.0085	4,144	.0107	12,514	.0090
Total division cost	2,700	.9441	5,670	.0773	4,144	.2430	12,514	.3169
Earth excavation ... per cent	2,700	100.00	5,670	100.00	4,144	100.00	12,514	100.00
Rock excavation ... do								

[1] Indicates credit.

GAILLARD CUT—CONSTRUCTION.

Item.	July.		August.		September.		October.		November.		December.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, small ladder dredges					3,674	$0.4049						
Repairs, small ladder dredges					3,674	.2170						
Operation, 3-yard ladder dredges	4,683	$0.3030					44,793	$0.1300	5,930	$0.3063		
Repairs, 3-yard ladder dredges	4,683	.3648					44,793	.1077	5,930	.6476		
Operation, small dipper dredgss	66,590	.1028	55,407	$0.0883	51,302	.1160	20,199	.1016				
Repairs, small dipper dredges	66,590	.1384	55,407	.1091	51,302	.1435	20,199	.1060				
Operation, large dipper dredges	183,534	.0717	217,325	.0632	216,825	.0636	82,195	.0741				
Repairs, large dipper dredges	183,534	.1640	217,325	.1607	216,825	.1389	82,195	.0951				
Operation, pipe-line dredges	53,997	.0753	83,541	.0579	46,444	.0769	30,841	.0881			1,940	$0.0342
Repairs, pipe-line dredges	53,997	.0643	83,511	.0710	46,444	.0594	30,841	.0805			1,940	.0315
Operation, tugs, clappets, and scows	254,807	.1022	272,732	.0982	271,801	.0990	147,187	.0865	5,930	.1402		
Repairs, tugs, clappets, and scows	254,807	.0885	272,732	.0924	271,801	.1086	147,187	.0915	5,930	.1094		
Operation, drill barges	260,807	.0069							5,930	.2071	970	6.9234
Repairs, drill barges	260,807	.0055							5,930	.0236	970	2.0096
Operation, rock breakers									5,930	.1484	970	1.9851
Repairs, rock breakers									5,930	.5126	970	.7449
Operation, miscellaneous floating equipment	308,804	.0089	356,273	.0088	318,245	.0117	178,028	.0088	5,930	.0111	1,940	.0263
Repairs, miscellaneous floating equipment	308,804	.0080	356,273	.0117	318,245	.0094	178,028	.0044	5,930	.0038	1,940	.0077

Item.	January.		February.		March.		April.		May.		June.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, small ladder dredges	980	$1.1714	4,742	$0.1873	655	$0.4631							10,051	$0.5105
Repairs, small ladder dredges	980	1.1458	4,742	.2733	655	.3525							10,051	.3656
Operation, 3-yard ladder dredges	28,438	.1813	8,910	.2396							5,891	$0.0998	98,645	.1757
Repairs, 3-yard ladder dredges	28,438	.1108	8,910	.2072							5,891	.0654	98,645	.1602
Operation, small dipper dredges			1,665	.1403	10,960	.1623	44,270	$0.0896	1,081	$0.2503	20,297	.0890	271,771	.1023
Repairs, small dipper dredges			1,665	.2368	10,960	.1569	44,270	.1094	1,081	.3189	20,297	.1157	271,771	.0407
Operation, large dipper dredges							53,560	.0391	279,165	.0440	254,015	.0413	1,286,619	.0557
Repairs, large dipper dredges							53,560	.0590	279,165	.0676	254,015	.0573	1,286,619	.0843
Operation, pipe-line dredges					25,502	.0558	43,155	.0574	8,111	.0889			293,531	.0679
Repairs, pipe-line dredges					25,502	.0386	43,155	.0333	8,111	.0382			293,531	.0592
Operation, tugs, clappets, and scows	29,418	.0955	15,317	.0770	11,615	.0698	97,830	.0625	280,246	.0726	280,203	.0701	1,667,086	.0865
Repairs, tugs, clappets, and scows	29,418	.1049	15,317	.0630	11,615	.0597	97,830	.0741	280,246	.0408	280,203	.0954	1,667,086	.0850
Operation, drill barges	29,418	.1197					102,145	.0212	281,057	.0016	280,203	.0086	1,690,847	.0108
Repairs, drill barges	29,418	.0392					102,145	.0046	281,057	.0004	280,203	.0076	1,690,847	.0044
Operation, rock breakers	29,418	.0329	15,317	.0827	14,165	.0548							1,690,847	.0034
Repairs, rock breakers	29,418	.0089	15,317	.0286	14,165	.0984							1,690,847	.0064
Operation, miscellaneous floating equipment	29,418	.0099	15,317	.0072	37,117	.0038	140,985	.0078	288,357	.0077	280,203	.0078	1,960,617	.0089
Repairs, miscellaneous floating equipment	29,418	.0033	15,317	.0039	37,117	.0086	140,985	.0089	288,357	.0062	280,203	.0082	1,960,617	.0084

	July.		August.		September.		October.		November.		December.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Qnantity.	Unit cost.
	Cu. yds.		*Cu. yds.*		*Cu. yds.*		*Cu. yds.*		*Cu. yds.*		*Cu. yds.*	
Drilling	260,807	$0.0339	280,189	$0.0086	274,625		146,021	$0.0007	5,930		970	
Blasting	260,807	.0019	280,189	.0043	274,625	$0.0191	146,021	.0023	5,930	$0.0919	970	$0.1927
Pipe lines	53,997	.0653	83,541	.0186	46,444	.0129	30,841	.0193			1,940	.0148
Operation, relay pumps	53,997	.0430	83,541	.0306	46,444	.0249	30,841	.0429			1,940	.0151
Repairs, relay pumps	53,997	.0113	83,541	.0076	46,444	.0126	30,841	.0033			1,940	.0813
Channel lights	308,804	.0006	356,273	.0006	318,245	.0009	178,028	.0006	5,930	.0006	1,940	.0007
Plant arbitrary	308,804	.0334	356,273	.0322	318,245	.0303	178,028	.0334	5,930	.0356	1,940	.0500
Division expense	308,804	.0249	356,273	.0403	318,245	.0337	178,028	.0287	5,930	.1932	1,940	.7864
Total division cost	308,804	.5206	356,273	.4603	318,245	.4941	178,028	.4276	5,930	2.7737	1,940	7.4299
Earth excavation ....per cent	47,997	15.54	76,084	21.35	43,620	13.71	32,007	17.98			970	50.00
Rock excavation ....do	260,807	84.46	280,189	78.65	274,625	86.29	146,021	82.02	5,930	100.00	970	50.00

Table No. 54.—*Dredging excavation—Detailed cost per unit of work, by months, fiscal year 1915*—Continued.

GAILLARD CUT—CONSTRUCTION—Continued.

	January.		February.		March.		April.		May.		June.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cu. yds.		*Cu. yds.*		*Cu. yds.*		*Cu. yds.*		*Cu. yds.*		*Cu. yds.*		*Cu. yds.*	
Drilling	29,418	....	15,317	....	14,165	....	102,145	....	281,057	$0.0056	280,203	$0.0089	1,690,847	$0.0091
Blasting	29,418	$0.0002	15,317	....	14,165	....	102,145	....	281,057	.0018	280,203	.0024	1,690,847	.0054
Pipe lines	....	....	....	....	25,502	$0.0042	43,155	$0.0112	8,111	.1304	....	....	293,531	.0274
Operation, relay pumps	....	....	....	....	25,502	.0211	43,155	.0262	8,111	.0502	....	....	293,531	.0324
Repairs, relay pumps	....	....	....	....	25,502	.0008	43,155	.0094	8,111	.0767	....	....	293,531	.0149
Channel lights	29,418	.0007	15,317	$0.0007	37,117	.0007	140,985	.0004	288,357	.0006	280,203	.0005	1,960,617	.0006
Plant arbitrary	29,418	.0659	15,317	.0767	37,117	.0513	140,985	.0369	288,357	.0132	280,203	.0149	1,960,617	.0285
Division expense	29,418	.0889	15,317	.0783	37,117	.0318	140,985	.0297	288,357	.0263	280,203	.0280	1,960,617	.0332
Total division cost	29,418	.9296	15,317	.8916	37,117	.3882	140,985	.3594	288,357	.3022	280,203	.3618	1,960,617	.4226
Earth excavation.....per cent	....	....	....	....	22,952	61.84	38,840	27.55	7,300	2.53	....	....	269,770	13.76
Rock excavation.........do	29,418	100	15,317	100	14,165	38.16	102,145	72.45	281,057	97.47	280,203	100	1,690,847	86.24

MIRAFLORES LAKE—CONSTRUCTION.

Item.	May.		June.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*	
Operation, pipe-line dredges	36,940	$0.1277	3,890	$0.1259	40,830	$0.1278
Repairs, pipe-line dredges	36,940	.0568	3,890	.0829	40,830	.0594
Operation, miscellaneous floating equipment	36,940	.0085	3,890	.0105	40,830	.0087
Repairs, miscellaneous floating equipment	36,940	.0031	3,890	.0022	40,830	.0030
Pipe lines	36,940	....	3,890	.0094	40,830	.0009
Plant arbitrary	36,940	.0500	3,890	.0500	40,830	.0500
Division expense	36,940	.0047	3,890	.0217	40,830	.0095
Total division cost	36,940	.2508	3,890	.3026	40,830	.2593
Earth excavation.....per cent	36,940	100.00	3,890	100.00	40,830	100.00
Rock excavation.....do	....	....	....	....	....	....

PACIFIC ENTRANCE—CONSTRUCTION.

	July.		August.		September.		October.		November.		December.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, small ladder dredges	11,996	$0.2130	27,993	$0.1376	2,007	$0.1216	....	....	....	....	....	....
Repairs, small ladder dredges	11,996	.1922	27,993	.1194	2,007	.0881	....	....	....	....	....	....
Operation, 3-yard ladder dredges	....	....	110,194	.0820	106,182	.0881	15,218	$0.0645	52,970	$0.1092	75,205	$0.0853
Repairs, 3-yard ladder dredges	....	....	110,194	.0924	106,182	.0893	15,218	.0543	52,970	.1951	75,205	.0857
Operation, tugs, clapets, and scows	11,996	.0727	138,187	.0637	108,189	.1076	15,218	.1114	52,970	.0881	75,205	.0688
Repairs, tugs, clapets, and scows	11,996	.0354	138,187	.0340	108,189	.0572	15,218	.0658	52,970	.0331	75,205	.0297
Operation, drill barge	....	....	....	....	....	....	....	....	....	....	....	....
Repairs, drill barge	....	....	....	....	....	....	....	....	....	....	....	....
Operation, rock breaker	7,997	.1496	102,433	.0041	36,063	.0241	5,073	.0500	....	....	....	....
Repairs, rock breaker	7,997	.0060	102,433	.0232	36,063	.1077	5,073	.0141	....	....	....	....
Operation, miscellaneous floating equipment	11,996	.0034	138,187	.0023	108,189	.0034	15,218	.0042	52,970	.0032	75,205	.0022
Repairs, miscellaneous floating equipment	11,996	.0014	138,187	.0012	108,189	.0008	15,218	.0008	52,970	.0002	75,205	.0012
Blasting	7,997	.0100	102,433	.0007	36,063	.0017	5,073	....	10,594	....	21,644	....
Channel lights	11,996	.0007	138,187	.0005	108,189	.0006	15,218	.0010	52,970	.0006	75,205	.0006
Plant arbitrary	....	....	138,187	.0144	108,189	.0185	15,218	.0328	52,970	.0339	75,205	.0266
Division expense	11,996	.0204	138,187	.0268	108,189	.0206	15,218	.0265	52,970	.0274	75,205	.0183
Total division cost	11,996	.6535	138,187	.3549	108,189	.4312	15,218	.3891	52,970	.4908	75,205	.3184
Earth excavation ... per cent	3,999	33.34	35,754	25.87	72,126	66.67	10,145	66.67	42,376	80.00	53,561	71.22
Rock excavation ... do	7,997	66.66	102,433	74.13	36,063	33.33	5,073	33.33	10,594	20.00	21,644	28.78

TABLE NO. 54.—*Dredging excavation—Detailed cost per unit of work, by months, fiscal year 1915*—Continued.

PACIFIC ENTRANCE—CONSTRUCTION—Continued.

	January.		February.		March.		April.		May.		June.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, small ladder dredges	....	....	7,003	$0.1629	13,139	$0.1159	10,402	$0.1536	13,432	$0.1474	20,148	$0.1273	106,120	$0.1499
Repairs, small ladder dredges	....	....	7,003	.1642	13,139	.0771	10,402	.1275	13,432	.0989	20,148	.1430	106,120	.1243
Operation, 3-yard ladder dredges	32,511	$0.1301	....	....	....	....	....	....	....	....	....	....	392,280	.0913
Repairs, 3-yard ladder dredges	32,511	.0796	....	....	....	....	....	....	....	....	....	....	392,280	.1017
Operation, tugs, clapets, and scows	32,511	.0997	7,003	.2609	13,139	.1893	10,402	.1757	13,432	.1173	20,148	.0715	498,400	.0908
Repairs, tugs, clapets, and scows	32,511	.0425	7,003	.2452	13,139	.0758	10,402	.0796	13,432	.0515	20,148	.0185	498,400	.0447
Operation, drill barge	10,837	.3849	5,251	1.7523	7,959	1.0340	5,201	.9829	6,716	.2165	....	....	227,529	.1240
Repairs, drill barge	10,837	.0895	5,251	.1776	7,959	.0867	5,201	.1413	6,716	.0725	....	....	227,529	.0168
Operation, rock breaker	10,837	.0813	5,251	.0987	....	....	....	....	....	....	....	....	227,529	.0182
Repairs, rock breaker	10,837	.0209	5,251	.0343	....	....	....	....	....	....	....	....	227,529	.0319
Operation, miscellaneous floating equipment	32,511	.0023	7,003	.0231	13,139	.0041	10,402	.0036	13,432	.0050	20,148	.0042	498,400	.0032
Repairs, micellaneous floating equipment	32,511	.0004	7,003	.0013	13,139	.0002	10,402	.0005	13,432	.0040	20,148	.0005	498,400	.0009
Blasting	10,837	....	5,251	....	7,959	....	5,201	....	6,716	....	7,761	....	227,529	.0010
Channel lights	32,511	.0007	7,003	.0006	13,139	.0015	10,402	.0008	13,432	.0011	20,148	.0009	498,400	.0007
Plant arbitrary	32,511	.0326	....	....	....	....	....	....	....	....	....	....	498,400	.0187
Division expense	32,511	.0445	7,003	.1538	13,139	.0884	10,402	.0933	13,432	.0748	20,148	.0373	498,400	.0317
Total division cost	32,511	.6245	7,003	2.5632	13,139	1.2314	10,402	1.1967	13,432	.6805	20,148	.4086	498,400	.4820
Earth excavation.....per cent	21,674	66.67	1,752	25.02	5,180	39.42	5,201	50.00	6,716	50.00	12,387	61.48	270,871	54.35
Rock excavation..........do	10,837	33.33	5,251	74.98	7,959	60.58	5,201	50.00	6,716	50.00	7,761	38.52	227,529	45.65

TABLE NO. 55.—*Dredging excavation—Detailed cost per unit of work, by months, fiscal year 1915.*

ATLANTIC ENTRANCE—OPERATION AND MAINTENANCE.

Item.	July.		August.		September.		October.		November.		December.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, seagoing suction dredges	54,978	$0.0483	112,050	$0.0630	29,700	$0.0334	....	......	13,424	$0.0494	187,200	$0.0397
Repairs, seagoing suction dredges	54,978	.0347	112,050	.0124	29,700	.0427	....	......	13,424	.0299	187,200	.0242
Operation, pipe-line dredges	....	......	61,786	.0406	61,613	.0544	....	......	....	......	....	......
Repairs, pipe-line dredges	....	......	61,786	.0269	61,613	.0588	....	......	....	......	....	......
Operation, miscellaneous floating equipment	54,978	.0040	173,836	.0034	91,313	.0022	....	......	13,424	.0026	187,200	.0044
Repairs, miscellaneous floating equipment	54,978	[1].0003	173,836	.0009	91,313	.0002	....	......	13,424	.0019	187,200	.0110
Pipe lines	....	......	61,786	......	61,613	.0030	....	......	....	......	....	......
Channel lights	54,978	.0010	173,836	.0007	91,313	.0005	....	......	13,424	.0006	187,200	.0010
Division expense	54,978	.0067	173,836	.0074	91,313	.0057	....	......	13,424	.0250	187,200	.0052
Total division cost	54,978	.0944	173,836	.1042	91,313	.1117	....	......	13,424	.3458	187,200	.1055
Earth excavation ... per cent	54,978	100	173,836	100	91,313	100	....	......	13,424	100	187,200	100
Rock excavation ... do	....	......	....	......	....	......	....	......	....	......	....	......

Item.	January.		February.		March.		April.		May.		June.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantitiy.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, seagoing suction dredges	219,584	$0.0436	238,264	$0.0377	224,141	$0.0337	30,561	$0.0601	....	......	....	......	1,109,902	$0.0421
Repairs, seagoing suction dredges	219,584	.0261	238,264	.0230	224,141	.0228	30,561	.0428	....	......	....	......	1,109,902	.0275
Operations, pipe-line dredges	....	......	....	......	....	......	....	......	....	......	....	......	123,399	.0476
Repairs, pipe-line dredges	....	......	....	......	....	......	....	......	....	......	....	......	123,399	.0429
Operation, miscellaneous floating equipment	219,584	.0041	238,264	.0029	224,141	.0014	30,561	.0070	....	......	....	......	1,233,301	.0032
Repairs, miscellaneous floating equipment	219,584	.0011	238,264	.0064	224,141	.0039	30,561	.0019	....	......	....	......	1,233,301	.0040
Pipe lines	....	......	....	......	....	......	....	......	....	......	....	......	123,399	.0015
Channel lights	219,584	.0008	238,264	.0007	224,141	.0004	30,561	.0008	....	......	....	......	1,233,301	.0006
Division expense	219,584	.0053	238,264	.0052	224,141	.0043	30,561	.0152	....	......	....	......	1,233,301	.0062
Total division cost	219,584	.0956	238,264	.0855	224,141	.0755	30,561	.1782	....	......	....	......	1,233,301	.1017
Earth excavation ... per cent	219,584	100	238,264	100	224,141	100	30,561	100	....	......	....	......	1,233,301	100
Rock excavation ... do	....	......	....	......	....	......	....	......	....	......	....	......	....	......

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[1] Indicates credit.

TABLE NO. 55.—*Dredging excavation—Detailed cost per unit of work, by months, fiscal year 1915*—Continued.

GAILLARD CUT—OPERATION AND MAINTENANCE.

Item.	July.		August.		September.		October.		November.		December.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, small ladder dredges	21,019	$0.2223			[1] 3,674	[1] $0.4019					8,876	$0.1041
Repairs, small ladder dredges	21,019	.2231			[1] 3,674	[1] .2170					8,876	.1155
Operation, 3-yard ladder dredges	53,855	.1382										
Repairs, 3-yard ladder dredges	53,855	.1666										
Operation, small dipper dredges	40,391	.0902	67,285	$0.0739	61,606	.0873	113,321	$0.0853	88,865	$0.0873	98,588	.0780
Repairs, small dipper dredges	40,391	.1140	67,285	.1725	61,606	.1097	113,321	.0936	88,865	.1157	98,588	.1061
Operation, large dipper dredges	7,565	.0657					180,470	.0180	280,821	.0554	310,257	.0515
Repairs, large dipper dredges	7,565	.1028					180,470	.0601	280,821	.0855	310,257	.0818
Operation, pipe line suction dredges							71,875	.0519	115,011	.0594	93,260	.0595
Repairs, pipe line suction dredges							71,875	.0475	115,011	.0373	93,260	.0514
Operation, seagoing suction dredges												
Repairs, seagoing suction dredges												
Operation, tugs, clapets, and scows	122,830	.0988	67,285	.0765	57,932	.1011	293,791	.0865	369,686	.0930	417,721	.0773
Repairs, tugs, clapets, and scows	122,830	.0864	67,285	.0714	57,932	.1127	293,791	.0915	369,686	.0790	417,721	.1138
Operation, drill barges												
Repairs, drill barges												
Operation, hydraulic grader No. 1			67,285	.0091	57,932	.0344	365,666	.0083	484,697	.0057	510,981	.0048
Repairs, hydraulic grader No. 1			67,285	.0002	57,932	.0071	365,666	.0005	484,697	.0005	510,981	.0018
Operation, miscellaneous floating equipment	122,830	.0087	67,285	.0089	57,932	.0116	365,666	.0085	484,697	.0081	510,981	.0083
Repairs, miscellaneous floating equipment	122,830	.0078	67,285	.0118	57,932	.0092	365,666	.0043	484,697	.0035	510,981	.0024

Item.	January.		February.		March.		April.		May.		June.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, small ladder dredges													26,221	$0.1841
Repairs, small ladder dredges													26,221	.1891
Operation, 3-yard ladder dredges			9,663	$0.2191	102,344	$0.0866	100,987	$0.0759	120,874	$0.0716	167,376	$0.0467	555,099	.0767
Repairs, 3-yard ladder dredges			9,663	.1879	102,344	.0843	100,987	.0998	120,874	.0699	167,376	.0306	555,099	.0776
Operation, small dipper dredges	97,493	$0.0860	116,694	.0753	90,632	.0793	44,264	.0850	78,728	.0925	51,065	.1195	948,932	.0850
Repairs, small dipper dredges	97,493	.1145	116,694	.1062	90,632	.0800	44,264	.1097	78,728	.1127	51,065	.1381	948,932	.1073
Operation, large dipper dredges	355,232	.0449	321,611	.0371	341,900	.0404	319,415	.0386	71,065	.0358	89,395	.0499	2,277,731	.0446

Repairs, large dipper dredges	355,232	.0724	321,611	.0567	341,900	.0538	319,415	.0523	71,065	.0540	89,395	.0632	2,277,731	.0641
Operation, pipe line suction dredges	122,044	.0574	126,368	.0515	98,898	.0486							627,456	.0549
Repairs, pipeline suction dredges	122,044	.0476	126,368	.0390	98,898	.0336							627,456	.0427
Operation, seagoing suction dredges							30,066	.0730	112,125	.0730	132,936	.0671	275,127	.0701
Repairs, seagoing suction dredges							30,066	.0387	112,125	.0667	132,936	.0469	275,127	.0541
Operation, tugs, clapets, and scows	452,725	.0720	447,968	.0786	534,876	.0737	464,666	.0649	270,667	.0722	307,836	.0691	3,807,983	.0771
Repairs, tugs, clapets, and scows	452,725	.0785	447,968	.0609	534,876	.0635	464,666	.0763	270,667	.0406	307,836	.0910	3,807,983	.0785
Operation, drill barges									270,667	.0116	307,836	.0052	3,868,540	.0012
Repairs, drill barges									270,667	.0029	307,836	.0016	3,868,540	.0006
Operation, hydraulic grader No. 1	574,769	.0042	574,336	.0070	633,774	.0054	494,732	.0050	382,792	.0102	440,772	.0050	4,710,566	.0062
Repairs, hydraulic grader No. 1	574,769	.0005	574,336	.0003	633,774	.0001	494,732	.0003	382,792	.0006	440,772	.0017	4,710,566	.0007
Operation, miscellaneous floating equipment	574,769	.0080	574,336	.0072	633,774	.0058	494,732	.0080	382,792	.0077	440,772	.0077	4,710,566	.0077
Repairs, miscellaneous floating equipment	574,769	.0027	574,336	.0039	633,774	.0094	494,732	.0090	382,792	.0070	440,772	.0082	4,710,566	.0058

Item.	July.		August.		September.		October.		November.		December.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Drilling	122,830	$0.0065	66,399	$0.0053	57,932		300,449		381,187	$0.0045	426,271	$0.0027
Blasting	122,830	.0089	66,399	.0183	57,932	$0.0012	300,449	$0.0121	381,187	.0014	426,271	.0003
Pipe lines							71,875	.0101	115,011	.0057	93,260	.0159
Operation, relay pumps							71,875	.0225	115,011	.0245	93,260	.0260
Repairs, relay pumps							71,875	.0017	115,011	.0007	93,260	.0013
Channel lights	122,830	.0007	67,285	.0006	57,932	.0009	365,666	.0006	484,697	.0007	510,981	.0007
Plant arbitrary	122,830	.0473	67,285	.0573	57,932	.0580	365,666	.0339	484,697	.0314	510,981	.0295
Division expense	122,830	.0333	67,285	.0511	57,932	.0377	365,666	.0256	484,697	.0310	510,981	.0288
Total division cost	122,830	.5855	67,285	.5682	57,932	.5445	365,666	.3696	484,697	.3660	510,981	.3840
Earth excavation ... per cent			886	1.32			65,217	17.84	103,510	21.36	84,710	16.58
Rock excavation ... do	122,830	100	66,399	98.68	57,932	100	300,449	82.16	381,187	78.64	426,271	83.42

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[1] Credit due to transfer of cost of work performed by dredge Marmot in July at Gamboa dike to construction dredging.

TABLE No. 55.—*Dredging excavation—Detailed cost per unit of work, by months, fiscal year 1915*—Continued.

GAILLARD CUT—OPERATION AND MAINTENANCE—Continued.

Item.	January.		February.		March.		April.		May.		June.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Drilling	464, 929	$0. 0044	460, 608	$0. 0055	544, 766	$0. 0014	464, 666	$0. 0035	270, 667	$0. 0022	307, 836	$0. 0044	3, 868, 540	$0. 0033
Blasting	464, 929	. 0022	460, 608	. 0007	544, 766	. 0009	464, 666	. 0009	270, 667	. 0007	307, 836	. 0006	3, 868, 540	. 0024
Pipe lines	122, 044	. 0047	126, 368	. 0040	98, 898	. 0041							627, 456	. 0069
Operation, relay pumps	122, 044	. 0184	126, 368	. 0199	98, 898	. 0204							627, 456	. 0218
Repairs, relay pumps	122, 044	. 0003	126, 368	. 0007	98, 898	. 0018							627, 456	. 0010
Channel lights	574, 769	. 0005	574, 336	. 0006	633, 774	. 0006	494, 732	. 0005	382, 792	. 0009	440, 772	. 0005	4, 710, 566	. 0006
Plant arbitrary	574, 769	. 0262	574, 336	. 0319	633, 774	. 0260	494, 732	. 0200	382, 792	. 0345	440, 772	. 0296	4, 710, 566	. 0301
Division expense	574, 769	. 0271	574, 336	. 0287	633, 774	. 0248	494, 732	. 0269	382, 792	. 0286	440, 772	. 0232	4, 710, 566	. 0278
Total division cost	574, 769	. 3270	574, 336	. 3167	633, 774	. 3081	494, 732	. 3252	382, 792	. 3255	440, 772	. 3167	4, 710, 566	. 3467
Earth excavation.....per cent	109, 840	19. 11	113, 728	19. 80	89, 008	14. 04	30, 066	6. 08	112, 125	29. 29	132, 936	30. 16	842, 026	17. 88
Rock excavation..........do	464, 929	80. 89	460, 608	80. 20	544, 766	85. 96	464, 666	93. 92	270, 667	70. 71	307, 836	69. 84	3, 868, 540	82. 12

MIRAFLORES LAKE—OPERATION AND MAINTENANCE.

Item.	May.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*	
Operation, pipe-line dredges	8, 662	$0. 1286	8, 662	$0. 1286
Repairs, pipe-line dredges	8, 662	. 0571	8, 662	. 0571
Operation, miscellaneous floating equipment	8, 662	. 0085	8, 662	. 0085
Repairs, miscellaneous floating equipment	8, 662	. 0031	8, 662	. 0031
Plant arbitrary	8, 662	. 0500	8, 662	. 0500
Division expense	8, 662	. 0128	8, 662	. 0128
Total division cost	8, 662	. 2601	8, 662	. 2601
Earth excavation.....per cent	8, 662	100. 00	8, 662	100. 00
Rock excavation..........do				

PACIFIC ENTRANCE—OPERATION AND MAINTENANCE.

Item.	July.		November.		April.		Total.	
	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.	Quantity.	Unit cost.
	Cubic yards.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Operation, seagoing suction dredges	16,683	$0.0533	....	....	17,955	$0.1223	34,638	$0.0092
Repairs, seagoing suction dredges	16,683	[1].0050	....	....	17,955	.0648	34,638	.0313
Operation, small ladder dredges	....	....	8,974	$0.1425	....	....	8,974	.1429
Repairs, small ladder dredges	....	....	8,974	.1222	....	....	8,974	.1222
Operation, tugs, clapets, and scows	....	....	8,974	.0858	....	....	8,974	.0858
Repairs, tugs, clapets, and scows	....	....	8,974	.0325	....	....	8,974	.0325
Operation, miscellaneous floating equipment	16,683	.0034	8,974	.0033	17,955	.0032	43,612	.0033
Repairs, miscellaneous floating equipment	16,683	.0014	8,974	.0001	17,955	.0005	43,612	.0008
Channel lights	16,683	.0007	8,974	.0006	17,955	.0007	43,612	.0007
Division expense	16,683	.0202	8,974	.0285	17,955	.0118	43,612	.0185
Total division cost	16,683	.0740	8,974	.4155	17,955	.2033	43,612	.1979
Earth excavation ....per cent..	16,683	100.00	8,974	100.00	17,955	100.00	43,612	100.00
Rock excavation ....do....	....	....	....	....	....	....	....	....

[1] Indicates credit.

TABLE NO. 56.—*Panama Canal—Gamboa gravel production—Detailed cost per unit of work, by months, fiscal year 1915.*

Item.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Total.
Quantity ....cubic yards..	37,950	38,650	30,718	34,509	26,912	22,004	25,790	30.858	36,995	44,183	46,568	32,600	377,871
Unloading from barges	$0.0613	$0.0212	$0.0298	$0.0314	$0.0613	$0.0473	$0.0834	$0.0900	$0.0313	$0.0511	$0.0403	$0.0567	$0.0526
Switching	.0185	.0144	.0113	.0107	.0210	.0560	.0510	.0432	.0310	.0431	.0401	.0548	.0347
Storing	....	.0147	.0353	.0387	.0398	.0815	.0334	.0067	.0067	.0011	.0012	.0020	.0193
Hostling	.0039	.0025	.0011	.0008	.0013	.0016	.0015	.0011	.0009	.0008	.0007	.0009	.0015
Repairs to equipment	.0394	.0391	.0215	.0067	.0240	.0707	.0706	.0868	.0232	.0371	.0688	.1128	.0527
Dredging and towing	.2359	.2344	.2839	.2343	.3154	.6933	.7369	.4906	.3594	.3451	.2772	.4208	.3901
Loading from storage	....	....	....	....	....	.0149	.0362	.0174	.0327	.0001	....	....	.0080
Miraflores storage pile	....	....	....	....	....	....	....	.0112	.0049	.0090	.0040	....	.0029
Plant arbitrary	.1632	.1582	.1500	.1500	.1500	.1500	.1500	.1500	.1000	.1000	.1000	.1000	.1420
Division expense	.0014	.0014	.0053	.0018	.0039	.0131	.0009	.0026	.0031	.0128	.0120	.0131	.0066
Total division cost	.5236	.4859	.5382	.4744	.6167	1.1284	1.1639	.8996	.5932	.6002	.5443	.7611	.7104

NOTES.—Under "Total" 29,866 cubic yards have been deducted to adjust difference between cross-section measurements of stock pile and book balance. This amount was not deducted from monthly quantities.

From June, 1914, to March, 1915, the plant was operated by The Panama Railroad Company; after that date, by The Panama Canal.

TABLE NO. 57.—*Panama Canal—Detail of cost of production and distribution of electric current, Jan. 1, 1915, to June 30, 1915.*

	January.	February.	March.	April.	May.	June.	Total.
Power plants:							
Gatun hydroelectric	$2,435.29	$2,323.12	$1,980.15	$2,044.80	$2,073.50	$2,009.33	$12,866.19
Gatun steam	125.07	179.91	366.19	153.77	147.57	320.20	1,292.71
Miraflores steam	7,454.38	5,432.21	5,127.97	4,622.72	4,237.72	4,680.36	31,555.36
Reserve for depreciation	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	48,000.00
Total production cost	18,104.74	15,935.24	15,474.31	14,821.29	14,458.79	15,009.89	93,714.26
Substations:							
Cristobal	1,408.75	1,053.26	952.64	1,181.25	765.53	654.22	6,015.65
Gatun	1,266.32	1,002.99	984.37	1,184.10	926.87	911.19	6,275.84
Miraflores	1,323.51	1,019.63	1,152.14	1,627.81	1,589.96	1,568.45	8,281.70
Balboa	1,169.78	1,019.79	1,136.73	793.05	700.93	783.20	5,603.48
Transmission lines:							
Cristobal to Gatun	369.67	422.57	406.04	560.14	345.22	184.48	2,288.12
Miraflores to Balboa	317.79	212.31	261.99	549.98	248.41	188.93	1,779.41
Gatun underground	16.50						16.50
Gatun to Miraflores	1,413.22	2,463.43	1,360.52	1,440.93	1,984.28	2,067.72	10,730.10
Distribution line expense	1,533.76	[1] 936.78	[1] 374.02	1,148.25	1,706.39	592.90	3,670.50
Cost of current distributed	26,834.04	22,192.44	21,354.72	23,306.80	22,726.38	21,961.18	138,375.56
K. w. hours distributed	2,719,120	2,467,525	2,384,930	2,137,825	2,148,220	2,107,967	13,965,587
Cost per k. w. hour:							
Production	$0.0066	$0.0065	$0.0065	$0.0069	$0.0067	$0.0071	$0.0067
Current distributed	.0099	.0090	.0090	.0109	.0106	.0104	.0099

[1] Indicates credit.

TABLE NO. 58.—*Panama Canal—Cost of water per 1,000 gallons, April to June, 1915, Ancon-Balboa-Panama System.*

[Quantities exclude water used in city of Panama and north of Pedro Miguel.]

	Quantity, 1,000 gallons.	Operation Gamboa pump station.	Operation Miraflores filtration plant.	Operation Balboa pump station.	Maintenance water mains.	Total.
1915.						
April	121,370	$0.0179	$0.0128	$0.0168	$0.0151	$0.0626
May	115,235	.0272	.0133	.0134	.0096	.0635
June	99,962	.0147	.0157	.0172	.0212	.0688
Total	336,567	.0200	.0139	.0158	.0150	.0647

TABLE NO. 59.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1915, Gatun System.*

	Quantity, 1,000 gallons.	Maintenance Agua Clara reservoir.	Operation Agua Clara filtration plant.	Operation Agua Clara pumping station.	Maintenance water mains.	Total.
1914.						
July	38,754	$0.0186	$0.0319	$0.0373	$0.0111	$0.0989
August	33,278	.0225	.0229	.0485	.0144	.1083
September	28,030	.0187	.0297	.0356	.0296	.1136
October	26,733	.0257	.0285	.0363	.0207	.1112
November	24,790	.0245	.0271	.0427	.0195	.1138
December	25,013	.0196	.0256	.0344	.0202	.0998
1915.						
January	23,974	.0211	.0533	.0492	.0177	.1413
February	26,289	.0186	.0321	.0456	.0253	.1216
March	27,600	.0191	.0203	.0347	.0168	.0909
April	24,935	.0206	.0212	.0417	.0169	.1004
May	23,405	.0177	.0235	.0433	.0379	.1224
June	24,410	.0203	.0246	.0457	.0552	.1458
Total	327,211	.0206	.0283	.0411	.0229	.1129

TABLE NO. 60.—*Panama Canal—Cost of water per 1,000 gallons, fiscal year 1915, Colon-Cristobal system.*

[Quantities exclude water used in City of Colon.]

	Quantity, 1,000 gallons.	Maintenance Brazos Brook Reservoir.	Operation Mount Hope filtration plant.	Operation Mount Hope pump station.	Maintenance water mains.	Total.
1914.						
July	72,580	$0.0055	$0.0155	$0.0368	$0.0228	$0.0806
August	64,760	.0055	.0118	.0382	.0357	.0912
September	55,782	.0032	.0162	.0274	.0526	.0994
October	58,697	.0039	.0133	.0230	.0301	.0703
November	52,186	.0064	.0146	.0271	.0381	.0862
December	54,171	.0055	.0118	.0153	.0681	.1007
1915.						
January	54,233	.0056	.0214	.0229	.0157	.0656
February	47,000	.0057	.0181	.0183	.0381	.0802
March	51,782	.0085	.0118	.0174	.0244	.0621
April	56,650	.0051	.0098	.0165	.0195	.0509
May	62,648	.0049	.0092	.0169	.0110	.0420
June	69,337	.0088	.0069	.0159	.0093	.0409
Total	699.826	.0058	.0131	.0228	.0296	.0713

TABLE NO. 61.—*Panama Canal—Cost of operating employees' quarters, March to June, 1915, inclusive.*

	March.	April.	May.	June.	Total.
Gold, married:					
Disposal of garbage	$545.24	$635.21	$656.14	$579.67	$2,416.26
Care of grounds	1,417.71	1,922.12	1,911.99	2,182.63	7,434.45
Repairs to furniture	1,366.17	1,296.03	1,605.55	2,870.67	7,138.42
Repairs to refrigerators	849.98	970.95	1,037.90	1,598.02	4,456.85
Repairs to stoves	644.39	671.95	799.68	857.57	2,973.13
Corral service	730.34	1,131.99	1,299.65	1,190.90	4,352.88
Utility service	576.07	1,078.41	1,201.38	484.10	3,339.96
Local supervision	591.17	872.21	891.80	520.60	2,875.78
General supervision	28.95	30.27	130.28	39.99	229.49
Repairs to buildings	7,114.52	8,216.48	7,216.55	7,699.27	30,246.82
Total division cost	13,864.54	16,825.16	16,750.92	18,023.42	65,464.04
Gold, bachelor:					
Disposal of garbage	120.40	168.49	149.51	149.72	588.12
Care of grounds	363.43	332.45	341.82	439.07	1,476.77
Repairs to furniture	43.98	202.70	230.43	483.75	960.86
Janitor service	3,503.54	3,410.05	3,276.21	3,226.41	13,416.21
Corral service	220.06	243.41	400.49	432.91	1,296.87
Utility service	180.30	507.91	530.36	516.51	1,735.08
Local supervision	702.33	689.00	723.72	451.17	2,566.22
General supervision	27.74	24.23	107.63	33.73	193.33
Repairs to buildings	1,198.08	3,931.72	3,848.11	4,451.00	13,428.91
Total division cost	6,359.86	9,509.96	9,608.28	10,184.27	35,662.37
Total division cost, gold quarters	20,224.40	26,335.12	26,359.20	28,207.69	101,126.41
Silver, married:					
Disposal of garbage	243.92	192.99	223.35	222.25	882.51
Care of grounds	393.68	482.94	453.15	315.01	1,644.78
Corral service	80.33	215.88	124.40	148.99	569.60
Local supervision	164.41	164.38	145.08	103.84	577.71
General supervision	4.48	3.55	16.02	6.99	31.04
Repairs to buildings	998.91	1,219.09	984.69	1,874.27	5,076.96
Electric light		518.08	413.01	244.37	1,175.46
Total division cost	1,885.73	2,796.91	2,359.70	2,915.72	9,958.06
Silver, bachelor:					
Disposal of garbage	86.96	100.23	66.25	105.92	359.36
Care of grounds	268.63	192.15	169.55	222.77	853.10
Repairs to furniture		58.61	40.33	16.31	115.25
Janitor service	1,471.22	1,482.77	1,229.33	1,201.11	5,384.43
Corral service	49.28	97.73	65.86	100.71	313.58
Local supervision	303.99	247.01	212.29	177.02	940.31
General supervision	12.13	9.56	34.44	14.50	70.63
Repairs to buildings	691.67	600.96	697.30	849.73	2,839.66
Electric light		206.54	122.28	97.42	426.24
Total division cost	2,883.88	2,995.56	2,637.63	2,785.49	11,302.56
Total division cost, silver quarters	4,769.61	5,792.47	4,997.33	5,701.21	21,260.62
Total division cost, all quarters	24,994.01	32,127.59	31,356.53	33,908.90	122,387.03

TABLE No. 62.—*Statement of overhead expenses, fiscal year 1915.*

	Gross.	Charged direct to other interests.	Expenses apportioned.	Distribution.						
				Operation and maintenance of canal.	Construction of canal.	Fortifications.	Sales and services to outsiders.	Work done by fortifications division.	Sales and services to other departments of government.	Public works in cities of Panama and Colon.
Civil government:										
Administration	$8,891.62		$8,891.62	$6,517.49	$1,829.58	$287.75	$250.92			$5.88
Posts	71,847.83		71,847.83	21,803.87	36,363.60	7,534.13	5,684.86	$19.68	$427.30	14.39
Customs	19,162.50	$63.75	19,098.75	19,098.75						
Estates	2,415.10		2,415.10	2,415.10						
Police and prisons	219,615.46	26,083.90	193,531.56	61,187.85	97,228.18	19,444.98	14,187.11	52.98	1,385.11	45.35
Fire protection	74,553.57	219.36	74,334.21	74,334.21						
District court	16,996.37		16,996.37	16,996.37						
District attorney	8,988.11		8,988.11	8,988.11						
Canal Zone marshal	7,996.16		7,996.16	7,996.16						
Special attorney	9,206.03		9,206.03		9,206.03					
Land office	18,126.10	12,000.00	6,126.10	6,126.10						
Repairs to buildings	3,670.70		3,670.70	3,485.43	142.78	22.45	19.58			.46
Lights—street, lodge, hall, church	674.62		674.62	674.62						
Total	462,144.17	38,367.01	423,777.16	229,624.06	144,770.17	27,289.31	20,142.47	72.66	1,812.41	66.08
Health department:										
Administration	10,504.08		10,504.08	8,140.73	1,821.27	286.44	249.78			5.86
Medical storehouse	4,257.10		4,257.10	3,589.89	514.18	80.87	70.51			1.65
Ancon Hospital	404,894.90	221,930.37	182,964.53	35,331.55	106,564.21	22,882.87	16,046.12	74.86	2,027.66	37.26
Colon Hospital	42,006.35	12,121.92	29,884.43	28,356.71	1,177.31	185.16	161.46			3.79
Santo Tomas Hospital	11,131.87		11,131.87	10,128.48	773.25	121.61	106.04			2.49
Other hospitals and dispensaries	75,529.96	13,496.43	62,033.53	10,536.41	37,528.14	7,715.02	5,509.19	25.47	700.70	18.60
Quarantine	54,975.87	22,294.78	32,681.09	29,914.32	2,132.15	335.34	292.42			6.86
Sanitation—										
Panama	37,556.63	3,106.14	34,450.49	32,059.06	1,842.92	289.84	252.74			5.93
Colon	28,014.87	4,810.08	23,204.79	21,932.28	980.72	154.24	134.40			3.15
Zone	113,957.76	503.76	113,454.00	20,507.45	67,819.32	13,851.33	9,931.85	43.92	1,260.04	40.09
Disposal of garbage, etc.—										
Panama	54,060.41	41,081.27	12,979.14	9,235.95	2,884.64	453.67	395.60			9.28
Colon	23,675.14	13,166.81	10,508.33	9,029.56	1,139.60	179.22	156.28			3.67
Zone	17,034.78	229.91	16,804.87	2,675.91	10,509.22	2,001.89	1,479.41	3.52	127.94	6.98
Operation of Corozal farm	30,766.59	18,268.09	12,498.50	12,498.50						
Repairs to buildings	14,867.94		14,867.94	13,416.11	1,118.83	175.96	153.44			3.60
Total	923,234.25	351,009.56	572,224.69	247,352.91	236,805.76	48,713.46	34,939.24	147.77	4,116.34	149.21

TABLE NO. 62.—*Statement of overhead expenses, fiscal year 1915*—Continued.

	Gross.	Charged direct to other interests.	Expenses apportioned.	Distribution.						
				Operation and maintenance of canal.	Construction of canal.	Fortifications.	Sales and services to outsiders.	Work done by fortifications division.	Sales and services to other departments of government.	Public works in cities of Panama and Colon.
Administration:										
Executive office	$19,775.49		$19,775.49	$10,577.22	$30,257.61	$4,811.67	$3,913.22	$7.17	$190.40	$18.20
Timekeeping	106,474.94	$19,134.56	87,340.38	26,827.28	44,469.47	8,832.66	6,559,32	21.70	608.99	20.96
Clubs and playgrounds	41,566.95		41,566.95	41,566.95						
Miscellaneous bureau	4,746.38		4,746.38	436.90	3,429.06	448.54	429.47			2.41
A. Correspondence	58,047.38	13,411.61	44,635.77	17,854.31	18,847.87	4,562.23	2,924.22	16.62	428.59	1.93
B. Record	39,565.09	10,318.88	29,246.21	11,698.48	12,315.07	3,006.00	1,920.71	10.82	293.73	1.40
C. Personnel	21,356.75	3,752.32	17,604.43	7,041.77	7,548.36	1,747.02	1,128.33	7.03	131.19	.73
D. Property and requisitions	25,829.05	10,437.11	15,391.94	6,156.78	6,524.61	1,567.51	1,001.34	5.62	135.45	.63
E. General	34,889.85	5,139.85	29,750.00	11,899.99	12,506.87	3,051.86	1,963.91	10.95	314.92	1.50
Maintenance and care of administration building	20,868.11	54.14	20,813.97	20,813.97						
Operation of official motor cars	21,671.52	11,965.47	9,706.05	9,706.05						
Engineer of operation and maintenance	64,613.34	2,379.15	62,234.19	62,234.19						
Miscellaneous	32,786.53		32,786.53	32,786.53						
Auditor	316,805.28	79,928.02	236,877.26	108,747.71	92,654.92	18,987.40	14,858.11	50.33	1,522.88	55.91
Paymaster	50,720.65	4,990.00	45,730.65	24,374.02	15,626.78	3,031.69	2,474.05	7.39	204.65	12.07
Collector	32,508.66	5,135.00	27,373.66	27,373.66						
Assistant auditor, Washington	41,325.33	50.00	41,275.33	13,229.94	20,378.95	4,193.97	3,121.29	12.08	328.57	10.53
Disbursing clerk, Washington	11,104.32		11,104.32	3,552.54	5,581.35	1,085.84	795.75	3.33	85.04	.47
General bureau, Washington	64,868.60	932.71	63,935.89	21,283.63	31,036.21	6,490.74	4,603.72	20.82	485.87	14.90
Canal record	13,585.15		13,585.15	13,585.15						
Transportation of employees on Isthmus	133,542.15		133,542.15	23,814.51	79,099.67	16,967.99	11,770.17	59.73	1,800.64	29.44
Commuication, Isthmus	59,493.28		59,493.28	10,538.39	35,127.42	7,712.26	5,345.58	19.98	735.15	14.50
Communication, foreign	7,008.46	269.73	6,738.73	1,229.61	3,880.52	871.61	672.52	2.57	82.01	.11
Recruiting and transportation	164,586.56		164,586.56	28,384.73	100,546.00	20,355.98	14,060.82	60.62	1,125.25	53.16
Purchasing expenses in United States	214,348.34	300.47	214,047.87	36,547.68	129,135.57	26,618.11	19,055.67	87.36	2,535.86	67.62
Operation of stores	541,168.19	77,071.43	464,096.76	143,558.44	237,470.86	46,098.89	33,734.24	110.55	2,988.98	134.80
Repairs to storehouses	3,311.97		3,311.97	1,324.79	1,387.68	346.88	212.82	1.29	38.43	.08
Handling freight on docks	53,459.27		53,459.27	9,358.18	32,269.28	6,598.97	4,576.73	23.19	624.44	8.48
Operation of quarters	229,969.30	29,945.52	200,023.78	48,934.14	111,281.21	21,527.87	16,870.78	59.96	1,293.76	56.06
Repairs to quarters	74,212.51		74,212.51	18,182.69	40,899.63	8,257.12	6,259.95	22.39	564.27	26.46
Repairs to other buildings	4,792.54		4,792.54	768.31	2,950.05	586.02	440.88	1.43	43.61	2.24
Operation and maintenance of waterworks	250,940.84	99,820.84	151,120.00	23,223.42	94,481.28	17,989.18	13,770.89	52.44	1,541.68	61.11
Repairs to sewer system	16,282.07		16,282.07	14,218.12	1,597.62	234.10	229.97			2.26
Repairs to roads	62,644.90	7,196.70	55,448.20	42,822.05	9,794.40	1,419.00	1,400.32			12.43

Compensation to injured employees	133,072.63		133,072.63	22,670.99	80,895.98	16,262.63	11,914.26	49.33	1,233.74	45.70
Adjustments	1,943.61		1,943.61	392.01	1,151.44	239.03	160.76	.37		
Total	3,003,885.99	382,233.51	2,621,652.48	[2] 897,715.13	1,263,145.74	253,902.77	186,169.80	725.07	19,338.10	655.87
Total, overhead expenses	4,389,264.41	771,610.08	3,617,654.33	1,374,692.10	1,644,721.67	329,905.54	241,251.51	945.50	25,266.85	871.16

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[1] Credit.

[2] In addition to this amount, there was charged directly to "Administration," under "Maintenance and operation," the following items: Dr. Johnson's report on canal tonnage, $5,669.28; tonnage certificate blanks, $44.15; total, $5,713.43.

TABLE NO. 63.—*List of the items formerly carried as "General items," and a synopsis of the accounts to which they have been transferred in final distribution.*

Operation hotels and messes	Prorated to construction work of every character.
Lands purchased	To "Real estate" under "Construction of canal."
Cristobal and Balboa terminals.	Appraised value to "Panama Canal property operated by Panama Railroad"; balance prorated to construction work of every character.
Panama Railroad, second main track.	To "Construction of canal."
Relocation Panama Railroad.	To "Construction of canal."
Steamships	Appraised value of steamships *Panama* and *Colon* to "Panama Canal property operated by Panama Railroad"; balance in account to construction work of every character; steamships *Ancon* and *Cristobal* to "Equipment and tools."
Buildings	Appraised value of existing buildings to "Assets transferred to other departments United States Government," and to "Construction of canal" as the interest appears; balance prorated to construction work of every character.
Purchase from New Panama Canal Company.	To "Construction of canal."
Payment to Republic of Panama.	To "Construction of canal."
Loans to Panama Railroad Company.	To "Reequipment loans to Panama Railroad" and "First-mortgage bond loan to Panama Railroad."
Purchase Panama Railroad stock.	To "Construction of canal."
Waterworks, sewers, and paving, Panama and Colon.	To "Municipal work, Panama and Colon."
Zone waterworks, sewers, and roads.	Appraised value of existing units to "Assets transferred to other departments United States Government," and to "Construction of canal" as the interest appears; balance prorated to construction of every character.
Moving and care of French material and equipment.	To "Construction of canal."
Plant in Panama Railroad service.	To "Panama Canal property operated by Panama Railroad."
Permanent plant	To "Equipment and tools."

APPENDIX I.

REPORT OF THE CHIEF HEALTH OFFICER, DEPARTMENT OF HEALTH.

BALBOA HEIGHTS, CANAL ZONE, *July 19, 1915.*

SIR: I have the honor to submit the following report of the operations of the department of health for the fiscal year ending June 30. 1915.

Very respectfully,

CHAS. F. MASON,
Chief Health Officer.

Maj. Gen. GEO. W. GOETHALS, *United States Army,*
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

GENERAL REMARKS.

One case of smallpox occurred on the steamship *Panama*, which arrived at Cristobal on February 3, 1915. The patient was taken sick on the 7th and removed from the ship on the 10th. The disease was contracted prior to his arrival on the Isthmus. With this exception, no cases of yellow fever, smallpox, or plague have originated on or were brought to the Isthmus during the year.

There has been a steady reduction in force and expenses throughout the year. The gross cost of the department for the year was $923,108.78 as compared with $1,271,073.61 for 1914. The average number of employees on the rolls during the year was 37,715, as compared with 52,252 for 1914.

The shifting of population toward the Pacific end of the canal continued during the year.

During the year 39,561 persons were vaccinated in the cities of Panama, Colon, and the Canal Zone, and on board vessels.

During the latter part of the calendar year it was decided to make an annual physical examination of all male gold employees, and this was done during the months of December and January. There were 4,100 persons examined and the results were so satisfactory that the practice will be continued. No one was discharged as a result of the test, but much valuable information was obtained as to the physical condition of the personnel which will be as useful to the employees as to the United States.

There has been a large increase in the military element. At the beginning of the year there was but one regiment of Infantry and three companies of Coast Artillery stationed in the Canal Zone, with a mean strength for the year of 797. At the close of the year there were three regiments of Infantry, a company of Engineers, a company of Signal Corps, an ambulance company, seven companies of Coast Artillery, and a detachment of the Hospital Corps, with a total strength on the last day of the year of 6,248. With these commands are 373 women and children, thus nearly doubling the American white population.

Most of the troops are on the west bank of the canal in the former commission towns of Culebra, Empire, and Las Cascadas. The health of the military commands has been markedly good. There were 3,317 admissions and 8 deaths during the year; 431 of the admissions were for malaria.

VITAL STATISTICS.

EMPLOYEES.

The health of the employees remained good during the year. The total admission rate to hospitals and quarters was 337.21, compared with 473.15 for 1914. The total admission rate to hospitals for 1915 was 204.18, compared with 299.62 for 1914, and for disease alone 156.81, as compared with 220.62 for 1914.

The total death rate for 1915 was 5.72 as against 7.92 for 1914, and the death rate for disease 3.61, as compared with 5.17 for 1914. The noneffective rate for 1915 was 10.67, compared with 14.01 for 1914.

With regard to malaria the death rate has been reduced more than 32 per cent since 1914 (0.21 in 1915, 0.31 in 1914) and the admission rate to hospitals 20 per cent (56 in 1915, 70 in 1914). The total admission rate for malaria, hospitals and quarters, was 66.60 and the constantly noneffective rate, hospitals and quarter, was 1.29.

There were no deaths from hemoglobinuric fever throughout the year; there were two such deaths in 1914.

The admission rate for typhoid fever, 0.19, was more than 76 per cent less than for 1914, and the death rate for this disease was 0.03, as against 0.08 for 1914.

The admission rate for dysentery was 0.85, as compared with 1.74 for 1914, and the death rate 0.05, as against 0.13 for the previous year.

The death rate from pneumonia was 0.58, as compared with 0.96 for 1914.

The five diseases causing the highest number of hospital admissions, with their rates, were as follows:

	Admissions.	Rate.
Malaria	2,129	56.45
Venereal diseases	659	17.47
Mumps	291	7.71
Tuberculosis	117	3.10
Acute bronchitis	93	2.47

The five diseases causing the highest number of deaths, with their rates, were as follows:

	Deaths.	Rate.
Tuberculosis	25	0.66
Pneumonia	22	.58
Nephritis	11	.29
Heart, organic disease	10	.26
Malaria	8	.21

EFFECTS OF SEASON.

The highest death rate for disease occurred in the months of September and March, and the lowest in November and April. The highest admission rates for disease were in July and June, and the lowest in March and April.

EFFECTS OF RACE.

The admission rate to hospitals and death rate for disease for black employees were 167.96 and 3.70 per thousand, as compared with 412.15 and 3.04 from disease for white employees. The noneffective rate for disease and injuries for black employees per thousand was 9.16, as compared with 19.32 for white employees.

The admission rate to hospitals and quarters for malaria was 50.96 for blacks, as compared with 156.39 for white employees.

The total death rate for Americans was 5.44, as compared with 9.00 for Europeans. The admission rate to hospitals for disease for the latter was 593.00, compared with 292.93 for Americans. The admission rate for malaria to hospitals and quarters was 240.00 for Europeans, as compared with 107.07 for Americans.

The death rate among Americans, Europeans, and blacks from malaria, dysentery, and typhoid fever was as follows:

	Americans.		Europeans.		Blacks.	
	Deaths.	Rate.	Deaths.	Rate.	Deaths.	Rate.
Malaria	1	0.22	1	1.00	6	0.19
Dysentery	1	.22			1	.03
Typhoid fever					1	.03

DEPORTATIONS.

The number of deportations was 191, divided as follows: Employees, 105; nonemployees, 86; disease, 165; and injury, 26.

CANAL ZONE.

With an average population of 35,249 in the Canal Zone there was a total of 478 deaths during the year; of these 415 deaths were from disease, giving a rate of 11.77 per thousand, as compared with 14.46 for the year 1914. The death rate from tuberculosis was 1.33; the percentage of all deaths was 10.

The birth rate for the year was 18.18. The infant mortality for white children under 1 year of age was 36 per thousand and for colored children 326, with a general average of 237. Of the total deaths from disease, the percentage under 5 years of age was 48.

PANAMA CITY.

The average population of the city for the year was 60,382, among whom there was a total of 1,924 deaths; of these, 1,856 deaths were from disease, giving a rate of 30.74 per thousand, as compared with 34.25 for the preceding year. The death rates for malaria and dysentery were 1.39 and 0.48, respectively.

The birth rate for the year was 53.80. The infant mortality for the same period was 228.

Of the total deaths from disease, the percentage under 5 years of age was 53.

Tuberculosis gave a death rate of 3.89 and 12 per cent of the total deaths.

COLON.

The average number of inhabitants for the year was 27,815, among whom there were 627 deaths; of these 591 were from disease, giving a rate of 21.25 per thousand, as compared with 24.12 for the year 1914. The death rates for malaria and dysentery were 0.54 and 0.11, respectively. The death rate for tuberculosis was 2.80, 12 per cent of the entire deaths from all causes.

The birth rate for the year was 37.97, and the infant mortality 185.

Of the total deaths from disease, the percentage under 5 years of age was 46.

DIVISION OF HOSPITALS.

There have been considerable reductions in the personnel of this division and the cost of same during the year. The number of employees on July 1, 1914, was 532 and on June 30, 1915, 404. The cost of the division was $750,273.53 in 1914, and for 1915, $533,563.08.

There were 1,042 charity patients admitted, with a total of 48,634 days, as compared with 1,237 patients and 54,033 days in 1914. At a minimum average cost of $1 per day this represents an expenditure of about $48,634, of which $2,400 is returned by the department of civil administration.

The number of soldiers admitted to hospitals showed an increase, there being 1,969 admissions with 25,627 days treatment.

ANCON HOSPITAL.

The average number of patients constantly present in Ancon Hospital during the year was 802, as compared with 1,079 for 1914; the average number of employees constantly sick was 331 for 1915 and 584 for 1914.

The gross cost of the hospital for the year was $404,894.90, as compared with $521,043.70 for 1914.

Board of health laboratory.—The following is a summary of work of special interest undertaken by the laboratory staff during the last half of the fiscal year 1914–1915. A similar report was submitted covering the calendar year 1914.

A number of cases of mammitis have occurred among the dairy cattle at the Corozal farm. Specimens of milk were collected under aseptic precautions and examined bacteriologically. All examined presented evidences of infection, but no one organism seemed to be responsible for the epizootic. The organisms recovered were the *staphylococcus aureus*, *staphylococcus albus*, and a small diplococcus, which invariably died after the first transplant. These organisms occurred sometimes singly and sometimes in combination. Their constant presence coupled with the history of the condition seemed to indicate that they as a group (the pus-producing organisms) were responsible for the condition, and were carried from cow to cow in purely mechanical manner.

There has been one autopsy in a dairy cow suffering from mastitis, which revealed a multiple fibrino-purulent arthritis, and the only organism found in a smear examination was a small diplococcus. This may indicate a dissemination of the diplococcus recently recovered in association with two other organisms in the clinical cases investigated.

During the half year ending June 30, 1915, 1,449 Wassermann tests were performed; of these 370 were positive. The test was performed in a great variety of cases, many of which gave neither history nor signs directly suggestive of syphilis. The almost constant percentage of the positives is somewhat surprising.

Month.	Total number.	Positive.	Per cent positive.	Month.	Total number.	Positive.	Per cent positive.
January	216	61	28	May	289	89	30
February	200	45	22	June	295	67	22
March	216	44	20				
April	233	64	27	Total	1,449	370	25

No attempt is made to draw conclusions from these figures, because of the conflicting factors concerned.

Further observations on blood films from the placenta, mothers' peripheral blood, and the blood from the umbilical cord, appear to establish the importance of the placental blood film examination as a diagnostic aid to the obstetrician in the tropics wherever estivo-autumnal malaria is endemic. It may frequently differentiate malaria in the puerperium from puerperal sepsis, and will many times offer a speedy confirmation of the presence of malaria when the peripheral blood is of little help.

Observations have been continued on joint erosions found at autopsy with reference to their coincident relation to arteriosclerosis, acute diseases (especially syphilis), and to occupational factors.

The frequent finding of purulent otitis media in infants coming to autopsy which have shown no external discharge or local evidence of the disease has stimulated a study of this condition in order to determine its relation to the cause of death. In many instances it is the only gross evidence of disease found.

The autopsies on swine from the hospital farm dying of hog cholera reveals an almost constant finding of a large ulcer on the dorsal surface of the tongue near its root. Efforts are being made to determine whether it be a coincident lesion or one of the early lesions of hog cholera, since it appears to be older than the intestinal lesions. Continued observation on the lesion will be made to determine whether it may be a factor of clinical diagnostic importance. (A single case of enterocolitis in swine has been established as an acute enteric disease due to Balantidium coli.)

Some of the unexplained deaths of young calves from the hospital farm are now being found at autopsy to be due to infection of the umbilical cord and liver.

A review of the anatomical and surgical records from a pathological standpoint indicates that tuberculosis is as important a factor in this tropical region as it is in other climates. Since the sanitary control of insect and water-borne disease has been accomplished it is evident that tuberculosis leads all other single factors as a cause of death. The duration of its course in the Negro is better represented by months rather than by years and the disease is more often widely disseminated in this race. Arrested or healed foci are not frequently found. Bone joint and cutaneous tuberculosis are less common here than in the United States.

An examination was made of the applicability of certain new methods of analysis to the conditions encountered here—such as the determination of the nitrogenous constituents of milk by titration with potassium hydroxide and formaldehyde; the determination of metals in alloys; brass and bearing metal and mixtures of both, and the determination of morphine in specimens of opium confiscated by the police.

The gasoline used in the laboratory for the preparation of gas has never been entirely satisfactory. Work has been started on the study of the commercial products furnished The Panama Canal to determine whether or not the efficiency of the gasoline might be increased.

A study was undertaken of the nature of the action of emulsions of crude carbolic acid upon bacteria in high dilutions. The constituents of the emulsion are toxic to bacteria, but in the state of an emulsion their characteristics are suppressed; that is, they become subordinate to the characteristics of the emulsion. This is accomplished through the assumption of electrical properties by the particles of the emulsion. As long as the electrical properties remain intact the emulsion persists and its constituents remain in the background, but when these properties are removed the emulsion breaks up, and this the bacteria are able to do. They cause the disruption of the particles through their own electrical properties and are then brought into contact with the constituents of the emulsion in their free toxic state.

Insane department.—During the month of April the transfer of the insane department of Ancon Hospital to the farm at Corozal was completed, and at the same time the name of the institution was changed to "The Corozal Hospital for the Insane," though the supervision remains in charge of the superintendent of Ancon Hospital, and the farm for the disabled was made an integral part of the hospital for the insane. Some months earlier the Ancon Hospital dairy and poultry yards had been removed to the farm.

Chronic ward.—On September 1, 1914, the chronic ward was transferred from Colon to Ancon Hospital. At the close of the year there were 26 chronic and incurable patients under treatment. The cost per patient per day was $0.29.

Detailed statistics are shown in Table XVIII.

COLON HOSPITAL.

Building No. 1, which had been badly damaged and rendered unsafe for occupancy in the storm of February 9, was torn down and removed, and later building No. 17 was demolished to make way for the new hospital building upon which construction work was begun in the month of June. It is expected that the new hospital will be ready for occupancy next spring.

Detailed statistics are shown in Table XIX.

PALO SECO LEPER ASYLUM.

The increase in the number of patients at the Leper Asylum made it necessary to erect an additional four-room building for their accommodation. The old storehouse was converted into additional quarters for attendants and a new building for office, storehouse, and dispensary was erected, all by the paid labor of the lepers. All the old buildings were being repaired, screened, and painted, and the work was close to completion at the end of the year.

At the beginning of the year there were 49 patients and at the close 56. During the same year there were 14 admissions, 5 deaths, and 1 patient discharged apparently well.

Arrangements were made for the installation of a telephone system. A gasoline launch was purchased to insure better communication with the asylum, but on account of structural defects has been very unsatisfactory. As the number of patients is still increasing it will probably be necessary to erect still another building in the current year.

On account of the danger of fire from the constant shortage of water, the use of oil lamps, the wooden buildings, and the absence of a fire department, it is highly desirable that electric lighting be arranged for as soon as possible.

Detailed statistics are shown in Table XX.

SANTO TOMAS HOSPITAL.

With the large increase in the number of inhabitants of the city of Panama, Santo Tomas Hospital has grown correspondingly, the average number of patients being now more than 20 per cent greater than at the beginning of the year.

Detailed statistics are shown in Tables XXI and XXII.

DISTRICT DISPENSARIES.

The number of line dispensaries has been reduced from 10 at the close of 1914, to 7 at the close of 1915, and 2 of these do not require a physician.

The stations having the highest admission rates for malaria were Corozal and Pedro Miguel with an average weekly percentage of 0.30 and 0.28, and the lowest Balboa and Gatun with 0.13 and 0.14.

Detailed statistics are shown in Table IX.

MEDICAL STOREHOUSE.

The new medical storehouse at Ancon was completed and occupied in January, and the old building at Colon Hospital turned over to the supply department.

SANITATION.

CANAL ZONE.

The number of sanitary inspection districts at the close of the year was 6, as compared with 9 at the close of 1914. The total cost of the division in 1915 was $130,867.07 as compared with $249,291.02 for 1914. The per capita cost of Zone sanitation, proper, per day, based on the number of employees, was $0.008, as compared with $0.01 for 1914.

For some months past the supply department has been slaughtering cattle for sale to employees as beef. In April two steers which were being held for slaughter died, and post-mortem diagnosis of anthrax was made. One of these animals had been brought from Colombia, and the other from Chiriqui Province, Panama. Since that time a careful examination of all beef cattle has been made, before and after slaughter, but no more cases have been found. In order to thoroughly protect the public health, the Governor, on June 1, 1915, issued a quarantine proclamation (Circular 700), based on section 276 of the penal code of the Canal Zone, and a veterinary inspector has been employed by the health department for the special purpose of making the examinations required.

Detailed statistics are shown in Table XXV.

PANAMA.

Since the reorganization, April–June, 1914, the general sanitary condition of the city has shown marked improvement. The city is now divided into four districts, each in charge of an inspector, who has a small gang, usually three laborers, and covers his entire district at least once a week. These inspectors perform general routine work such as locating and destroying breeding places for flies and mosquitoes, trapping rats, serving notices on property owners for the correction of all sanitary nuisances found (which notices are enforced by fine if the parties at fault fail to comply promptly), investigating all complaints, supervising the removal of rubbish and other valueless material from yards, patios, and alleyways, seeing that plumbing fixtures, etc., are always kept in working order, that the required number of garbage cans are maintained on the premises, eliminating possible harboring places for rats, see that proper cleanliness is maintained in all stores or other buildings to which the public have access, spreading oil or larvacide in all drains or ditches when necessary, etc.

Supervision is maintained over sidewalks, these being kept clean and in good repair by property owners, all holes or low places being filled in promptly, as these have been found to be a fruitful source of mosquito breeding.

There have been an average of 200 notices per month for the abatement of nuisances, which is a fair indication of the magnitude of the work. Fines exceeding $700 have been imposed for violation of sanitary regulations during the past year.

Tuberculosis.—Tuberculosis is quite prevalent in Panama, which is to be expected, and there is but little hope for any radical improvement in the near future. The problem is mainly an economic one and rests with the Panamanians themselves. The authorities and the more public-spirited citizens are beginning to manifest some interest in this problem, which will help greatly toward its eventual solution.

Considering the unfavorable climate, overcrowding in houses, large number of unemployed who must necessarily be underfed, the number of deaths from tuberculosis is relatively small. Approximately 12 per cent of the total deaths in Panama during the past fiscal year have been caused by tuberculosis in various forms. In all probability, however, this figure is short of the actual number who have died from this disease. Many deaths diagnosed clinically as resulting from pneumonia and broncho-pneumonia may actually have been caused by an acute form of tuberculosis.

A spot map was kept for several months, and colored pins inserted at the house location of each fatal case. From this it was learned that the distribution of the disease was quite general. In that section of the city where the more influential element reside and in the newly completed section of Chorillo the cases were decidedly fewer, which may be attributed to better living conditions.

The people most generally affected by tuberculosis are the ignorant class, afraid of "night air" when sleeping, living in rooms far too crowded and in which a good circulation of air is discouraged.

Those contracting the disease do not have it recognized sufficiently early to be benefited by treatment here, and when such a patient applies for hospital treatment he is usually in the advanced stages of the disease, when it is only a matter of a short time until he succumbs. When a patient is treated for the disease in its incipiency, it is usually considered a bronchial affection.

A more favorable climate is to be found in the hills in the interior of the Republic, where there is less rainfall and humidity and a higher elevation, and it is hoped that the Panamanian Government will find means for the establishment at such a place of a sanitarium for these cases.

It is our intention to educate the people along the lines of insuring greater freedom from infection, and for this purpose equipment has been ordered for giving illustrated lectures both in the Canal Zone and the two terminal cities.

Typhoid fever.—During the past year a total of 17 cases of typhoid fever have been reported, of which 14 were positive and 3 were suspected cases. Three cases terminated fatally.

There were three cases reported in February, 1915, all from one city block which strongly indicated the presence of a carrier. With the presence of a large number of house flies, an open sewer in the neighborhood was also under suspicion. After correction of this, no further cases developed in that locality.

The extremely low rate of typhoid for a city the size of Panama, with its very mixed population, is the result of the policy of the health department during the past 10 years in compelling all house owners to "hitch their houses to the sewers." In the few isolated cases where this has been impracticable, fly-proof pit closets have been installed which have been oiled or larvacided at frequent interval to repel any flies that might have entered.

The purity of the public water system and the elimination of itinerant water venders has also helped toward this end, as has the fly-prevention work and the prompt sending of all typhoid cases to the hospital as soon as located. For several years the selling of water was permitted from certain wells and until recently the water from these wells was drinkable but the periodic examination eventually showed that they were contaminated, and a few months ago it was found necessary to suppress all water venders and close the wells.

Malaria.—At no time during the past fiscal year has the hospital admission rate for malaria from the city exceeded 0.20 per cent. Since May of this year, the hospital admission rate for the entire city (at both Ancon and Santo Tomas Hospitals) has been constantly decreasing until it has reached the extremely low figure of 0.01 per cent.

This means that from an average of 50 to 60 admissions per week to Ancon and Santo Tomas Hospitals from the city for malaria, the number has dropped until now there are only from 8 to 10 admissions per week to both hospitals. During May and June of 1914 the hospital admissions for malaria from the city were about three times what they have been for the same months during the present year. This represents a great saving in expense alone, for the average cost of maintaining a patient at Ancon Hospital has been in the neighborhood of $1 per day.

It should be considered that practically the entire population of Panama is living in unscreened houses and their necessary exposure to malarial infection is consequently greater.

The low malaria rate, however, can only be maintained by the constant watchfulness of a force of competent inspectors, with all necessary equipment for antimalarial work.

The antimalarial work has been extended to cover the entire needs of the constantly growing city, and now covers from the Canal Zone boundary line at Balboa east of Chorillo, across the city along the Ancon boundary line as far as and including Bella Vista and all territory lying between the beach and the Curundu River.

The usual work is carried on in the prevention of anopheles breeding, such as drainage, grass cutting, oiling by drip barrel, oil-soaked waste, and knapsack sprayers; the impounding of all cattle found at large, and watching the fences at all inclosed fields which are swampy and where cattle may have access. This has had a very good effect.

When cattle get into swampy places or where there are sanitary drainage ditches, a half dozen of them in a few hours will ruin thousands of feet of ditches; in addition to which, their tracks hold water and prove excellent breeding places for anopheles mosquitoes.

Near Bella Vista pavilion, a count was made, and in an area of 625 square feet, 300 animal tracks had anopheles and culex larvæ, and it is on this account that it is necessary to prevent animals gaining access to any tracts where there are swampy areas or sanitary drainage ditches.

The Panama Land Development Co., owners of the Bella Vista tract, have undertaken, at considerable expense, the drainage of the low-lying parts of their property, and up to June 30, 1915, have installed approximately 20,000 feet of drainage ditches, the water from which is conducted to the sea by a concrete culvert.

This work will indirectly aid in the sanitation of the entire city by removing the likelihood of malarial infection to patrons of the bathing beach, which place has heretofore been a constant focus of infection.

An active campaign has been carried on throughout the city against the domestic mosquito with the result that there are very few complaints received now of mosquito breeding. Every such complaint is at once investigated and the result has been that the source of breeding has usually been found in the house or patio from which the complaint originated.

The school children of Panama were instructed, by means of lectures and specimens of the larvæ, in the method of recognizing mosquito larvæ, and it is hoped that this will eventually aid materially in the complete elimination of the insects from the city.

A table is given below showing the comparative number and percentage of malaria cases sent to hospital from the city during the first few months of 1914 and 1915, respectively:

1914			1915		
Month.	Total cases.	Percentage.	Month.	Total cases.	Percentage.
January	319	0.13	January	127	0.04
February	111	.06	February	67	.03
March	123	.06	March	68	.03
April	107	.05	April	57	.03
May	194	.08	May	50	.02
June	137	.07	June	50	.02

Diphtheria.—During the year, 15 cases of diphtheria have been reported, of which only 1 case case terminated fatally. One carrier was admitted to Ancon Hospital. Careful check was made of all reported cases, and all contacts kept under close observation until the period of possible infection had passed.

Scarlet fever.—There were five cases of scarlet fever all of which were of a very mild type. The last reported case occurred in November, 1914.

Measles.—During the last half of 1914 only 1 case of measles was reported to this office as occurring in the city, but in January, 1915, there were 3 cases reported, followed by 19 in February and in March the maximum was reached, there being 54 reported cases. The number declined during April, May, and June. There were only 2 deaths reported, both cases being complicated with broncho-pneumonia. The epidemic was of a very mild type, and many light cases were never reported, and probably received no medical treatment.

Mumps, whooping cough, and chicken pox.—From time to time there have been reported a few cases of mumps, whooping cough, or chicken pox, which were always promptly investigated. Whenever possible, such cases were isolated and instructions given for the prevention of the spread of the disease. Whenever patients could be induced to seek hospital treatment this was done, which gave the public greater protection.

Undoubtedly many light cases of these diseases have occurred in the city which were not reported, and in most cases it was thought unnecessary by the people to even seek medical treatment.

Whooping cough was not made a reportable disease until January 1, 1915, since which date every effort has been made to see that as few cases as possible go unreported.

Vaccination.—A general vaccination of the city was undertaken in 1914, and up to June 30, 1915, 20,835 vaccinations had been performed. Careful watch has been kept on results and there have been no serious arm infections as a result of vaccination.

A system has been arranged whereby periodical inspections of public schools are made for unvaccinated children, and vaccinations performed where necessary. A record is kept in the schools, showing name and age of the child, date of vaccination, and result.

Street cleaning.—The work of cleaning and sprinkling the streets has been carried on successfully during the past fiscal year. During the greater part of the dry season it was necessary to use three street sprinklers, but when the rains began this was reduced to two, and then to one, which usually suffices to cope with any dust. All streets are swept daily, twice, by hand in connection with sprinking, and on one or two of the principal thoroughfares a gang is kept busy sweeping continually during the day, for six and one-half days a week.

Exact information is not available as to the total number of square yards of street in the city, but it is estimated at 300,000, making a total of 600,000 square yards of streets cleaned daily.

Garbage and dump.—Record has been kept of the amount of garbage and other rubbish collected daily in the city of Panama, and it has been found that this amounts to an average of 120 tons daily. Of this, from 20 to 23 tons daily consists of manure.

Garbage is collected at night in the business and better residence sections of the city, thereby obviating the necessity for placing garbage cans out during the day and obstructing the narrow sidewalks and streets. In the outer districts the collection is made by day. Six wagons are used in this service continually.

All garbage and other refuse is hauled to the city dump and cremated as fast as collected.

During the past year the approaches to and roads across the dumps have been improved and the drainage has been materially bettered. During the dry season no difficulty is experienced in cremating all material brought to the dump, but during the heavy rains there is very considerable difficulty in keeping the fires going at all times.

Plans have been considered for the erection of a modern incinerating plant, and it is hoped that funds will eventually be secured for this purpose. This will enable refuse of all kinds to be quickly and thoroughly disposed of, regardless of weather or any other exterior conditions.

During the greater part of the past year considerable difficulty has been experienced with fly breeding on the dump, but recently this has been overcome to a large extent. Fly traps were placed and as many as 250 quarts of flies trapped per month, there being approximately 13,000 flies to the quart.

Since July 1, 1914, 1,657 garbage cans have been placed in the city by the house owners and tenants. These are sold by the health department at a nominal rate, are of a uniform type, and suitably covered.

Rat work.—An average of about 500 rats per month has been caught and sent to the board of health laboratory for inspection for plague. No infected rats have been found. This work is carried on by trapping rats all over the city by the district inspectors, special care being exercised along the water front where there is the possibility of plague-infected rats gaining access to the city on ships from South American ports. The catch for each day is tagged, so that should a plague-infected rat be found the health officer will know at once just where to begin a campaign for stamping out the focus.

The removal of rubbish from the yards, patios, and alleys, elevation of lumber in lumber yards as well as of all scrap lumber found anywhere off the ground, to destroy possible harboring places, is constantly maintained.

At the demolishing of one dilapidated stable, 120 rats were killed in and around the feed room, and it is over such establishments as this that it is desirable to maintain constant supervision, as the rat is naturally a grain feeder and is attracted by the abundance of food supplies at such places.

Flies.—An active campaign has been conducted against fly breeding by the district inspectors, by the destruction of larvæ where found, and by exercising constant watch over stables, which are by far the most prolific sources of fly breeding. The greatest cleanliness possible is insisted upon. From time to time marked increases in the number of flies have been noted at different localities, and in most instances they have been traced directly to some neighboring stable, where vigilance on the part of the owner against this breeding has been allowed to relax.

Careful watch has been kept at the public markets, and every effort made to keep the flies at a minimum in these establishments. Meat and fish counters are washed down daily with larvacide solution.

Building inspection.—During the past fiscal year 286 permits have been issued for the construction of new buildings and 856 for repairs to old buildings.

Inspection is made of all buildings under construction or repair to see that the building regulations are complied with and that the buildings are constructed in accordance with the plans approved by the municipal government and this office.

Every effort is being made toward the complete rat proofing of all buildings in the city. Whenever a new building is erected or an old one repaired this feature is insisted upon.

Food inspection.—An inspector has been detailed for special work in this line. He makes frequent inspections of hotels, restaurants, bakeries, bottling works, fruit stands, markets, and cold-storage establishments. It has been necessary at various times to detail this inspector for other work which to some extent has curtailed the amount of time that could be devoted to food inspection alone. At the close of the fiscal year there were under regular observation:

Bakeries	29
Hotels and restaurants	42
Bottling works	22
Dairies and milk venders	51

Since January, 1915, a record has been kept of the work done in this line, a brief statement of which is as follows:

Dairies and milk venders inspected	322
Milk samples taken and analyzed	94
Hotels, restaurants, and clubs inspected	189
Bakeries inspected	169
Bottling works, breweries, and distilleries inspected	49
Miscellaneous inspections	475
Notices served for correction of nuisances or violations of sanitary regulations	41

The score-card system is used in inspecting hotels, restaurants, clubs, bakeries, bottling works, breweries, distilleries, and dairies.

Great effort is being made, with some success, to improve upon the milk supply for the city of Panama. Several dairies and other establishments have been closed for persistent and willful violation of sanitary rules and regulations, and the conditions existing in all of them have been greatly improved since the system was started.

Barber shops also come under this classification, and regular inspection is also made of these establishments to see that they comply at all times with the sanitary regulations.

Of the new and important sanitary ordinances which were referred to in my annual report for the calendar year, slow but steady progress has been made with all except that relating to the reporting and registration of births and deaths. This ordinance, which was approved by you on October 17 last, has not been published by the Panama Government, and therefore we are not getting these very important reports. The ordinance has been the subject of considerable correspondence, and I recommend that the publication and enforcement by the Panama Government be insisted upon.

When the street cleaning in Panama City was taken over by the Isthmian Canal Commission September 1, 1913, it was estimated that it could be done for $48,000 a year, and it was agreed that the Isthmian Canal Commission would contribute $10,000 of this amount, the remaining $38,000 being paid by the Panama Government. The agreement contained a clause that it might be terminated at the end of any 12 months thereafter, provided that notice was served two months in advance by either party to the agreement.

Since this arrangement was made the population of Panama has increased at least 33 per cent, and the area of streets and yards to be cared for and the amount of garbage to be removed has increased in the same proportion, rendering it impossible to do the work properly for the amount agreed upon. The Panama Government has therefore been notified of our desire to amend the existing arrangement so as to allow at least $60,000 for street cleaning, of which the Panama Government should furnish $50,000.

Detailed statistics are shown in Table XXV.

COLON.

The broad aim of the health work in Colon for the past year was to supplement the excellent work of the past years with certain measures specially designed to meet requirements for the opening and operation of the canal. Among these there were a number of structural improvements necessary to prevent rat infestation, as well as to diminish the accumulation of rubbish, and containers for Stegomyia and flies. Such were the condemnation and demolition of the Pacific Mail pier and the old Panama Railroad pier No. 1; another was the rat proofing of the Panama Railroad freight depot. Part of Panama Railroad pier No. 11 was repaired, and while it is not yet fully rat proof, it is greatly improved. The new Piers Nos. 8 and 9 are rat proof, as will also be No. 7, now in process of construction.

A notable improvement effected has been the concrete sea wall along Folks River water front, in the southern part of the city. This section had a low sloping beach, which had long been full of rubbish and the accumulation of filth from the tides as well as from the considerable schooner and cayuca trade which centered there. The wall runs from near the Consumer's Laundry to the canal corral, and the ground there is filled with cinders to street level, making the beach clean and neat, besides greatly improving the traffic facilities.

In cooperation with the alcade of Colon, many sidewalks were repaired. Better concrete was also put in this work than that formerly used. Houses in the city were condemned and demolished or replaced to the number of 82, and a larger number were repaired for sanitary reasons, the main repairs consisting of concreting the floors and side foundation walls.

The Panama Railroad corral was radically improved with concrete floors, pavements, and drains in and about all the stalls and vehicle sheds.

Structural repairs were made in the Colon market, the roof and floor being repaired, the toilets overhauled, marble and concrete slabs being placed in the meat and fish markets, and rat-proof chicken coops of standard type installed.

The Colon private stables were overhauled; one new and improved stable was built according to our plans; four stables were condemned. Further improvement of these stables is in progress. All pigs and live stock are required to be kept out of the city, either at these stables or at other designated centralized places. In extension of the plague-prevention work it was decided to diminish food supplies for rats by requiring all fowls and other pet animals whose food was usually exposed to be kept in standard rat-proof coops or cages. Feed for horses and cattle was also ordered to be properly kept in rat-proof containers. The killing of rats was carried on by two rat catchers with good results. The traps were the E. Z. K. killing trap and the Marty cage trap. A special mouse trap was designed and made and found effective. In certain cases poison was used.

Mosquito work was facilitated by several new measures. Some bad swamps in the southern end of Cristobal and near the cemetery in Mount Hope were filled in by hydraulic filling. Many vacant lots in Colon were filled by property owners at the request of this office. Large numbers of water barrels and other containers were eliminated by the condemnation and destruction of certain premises in Colon and in Mount Hope. The use of drip barrels of crude oil on ditches in Colon was commenced at places indicating their use. A notable work of mosquito elimination on Telfers Island was effected by drainage ditches and by admitting sea water into some low places. The locality known as Guava Ridge in Mount Hope, which was an obstinate breeding place, was ditched and drained. Special ditching of a breeding ground behind the radio station in Colon, caused by the settling of the hydraulic fill at the station, has been undertaken.

The campaign against flies was carried on by some measures additional to those already used with success. These were the improvement of the stable districts mentioned above, the better cleaning of garbage cans and stands, and the better policing of the premises around the cold-storage and manufacturing plant of the commissary. The great fire in Colon caused an increase in flies by canned goods bursting open under fallen structural material, but reduction of these flies was effected by spraying them with a solution of larvacide and by liberal use of fly paper.

The collection and destruction of garbage has been carried on as previously, except that the work in Cristobal district formerly done by the Quartermaster's Department, together with the grass cutting, was consolidated with that done in Colon under this office.

The general plan of periodic inspections has been carried on by having one inspector assigned to all building work, making a complete daily round of the city of Colon to see that new buildings and repairs are carried out according to regulations as well as to inspect the condition of all buildings.

Another inspector is given charge of the streets and alleys, garbage collection and destruction, grass cutting and ditching, and of the markets and slaughter houses. Another inspects daily the bakeries, bottling works, restaurants, hotels, grocery shops, barber shops, laundries, and all industrial establishments requiring sanitary attention, besides overseeing the rat work, conducting any special investigations of complaints as required, and seeing that orders for abatement of nuisances are enforced.

Another has charge of the daily mosquito and fly work, using a small gang of laborers, and covering the whole of Manzanillo Island at least once a week.

A periodical examination of the schools is carried on, both of the pupils and of their general sanitary conditions. No serious epidemic has occurred, the only infectious disease of an epidemic character during the year involving the schools having been that of mumps, which seems to have spread in the beginning from the colored population through domestics in the homes of the school patrons. The disinfection of school books, the use of sanitary paper cups, special lectures on hygiene and public health, the introduction of courses of study on these lines in the schools, and the coordination of the work of the teachers, the governmental and private physicians, and the health office have also been instituted.

The dredges in Colon Harbor have been regularly inspected and their condition improved.

There has been started a systematic card-reporting plan for keeping the health office informed at once of all notifiable diseases. The canal physicians, those of the Panama Government, and all private practitioners are required to report at once every case coming under observation with data adequate for dealing with the case as may be required. In the matter of tuberculosis control, some poor patients were sent to hospitals for treatment at the initiative of this office. This was made a notifiable disease, and premises are disinfected against it. Both by posters and by personal oral instruction by the health officer and inspectors a campaign of education has been carried on. The use of the public press has also been resorted to, and it is intended during the current year to increase these measures in a number of ways. Vaccination work was carried out by examining 22,866 persons; 22,275 were found protected, 591 were vaccinated.

The great fire in Colon of April 30, which destroyed 23 blocks of the city and rendered temporarily homeless about 5,000 people, naturally produced special sanitary problems and demanded energetic measures. Three hundred and fifty Army tents were loaned the homeless and set up on Broadway from Ninth Street to Colon Beach, as well as on several vacant lots. Some 50 box cars were also loaned by the Panama Railroad for use as shelter. A census taken soon after the fire showed only 37 vacant rooms in the whole city, and these were all special cases reserved for one reason or another. In installing this refugee camp, closets were set up on the street and trapped to the sewers. Some pit closets were used where water connections were not available. Washing and bathing were provided for. Pipes for drinking water were laid down. A detail of a sanitary inspector and a gang of men was made to work solely around these camps. A camp dispensary was established in charge of an Army medical officer, while the general care of the camp was in his hands, assisted by nine men from the Hospital Corps of the United States Army. No serious sickness occurred in or has been traceable to these camps. The health office cooperated as much as possible with the local Red Cross in its relief work. Inspectors distributed meal tickets and helped to locate and report needy cases. The inspectors did a good deal of personal relief work incidentally to the rounds of duty.

The burned area was cleaned up thoroughly and with commendable dispatch by forces of the Panama Railroad. The débris was packed into a dump on the hydraulic fill east of Broadway between Eleventh and Fourteenth Streets.

The general rise in rents throughout the city of Colon and the fact that there has been no rebuilding whatever has resulted in increasing rather than decreasing the number of persons who must be sheltered. The tents loaned by the Army are rapidly going to pieces and will last but a few months longer, and unless some other arrangement can be made for the sheltering of these people an acute situation will soon arise.

In order to accumulate information bearing on infant mortality and morbidity, the registration and control over midwives was made more effective. The cooperation of the Colon municipality was secured in this matter, and the records of the city are compared with the statistics of this office as a means of checking the reports.

Plans are now on foot for giving illustrated lectures on public health before the public and private schools in English and Spanish and for increasing the general educational influence of the work.

Detailed statistics are shown in Table XXV.

QUARANTINE DIVISION.

During the fiscal year the quarantine station on the Atlantic side was moved from the old quarantine reservation to the new one, on the Colon Hospital grounds. Small repairs were made to the buildings here, screening renewed, etc., and the arrangements for the comfort and care of detained passengers much improved.

At the Pacific entrance to the canal the quarantine station was removed from its old site, on Culebra Island, to the mainland, on the Balboa dump, the buildings being transferred and reconstructed. The present area, while farther from the anchorage grounds of incoming vessels, is very satisfactorily located, and the reservation well laid out, partially graded, and the new permanent landing stage nearly completed. Completion of grading, the laying of concrete walks, and the inclosing of the reservation is expected to place this station in very good condition.

The number of passengers inspected during the fiscal year was not nearly so many as during the previous year, practically falling off a third—probably due to the European war and the consequent financial depression occurring in other countries. On the other hand, the increase of vessels inspected on account of the opening of the canal amounted to 583, the number for 1914 being 1,447, with 2,030 for the fiscal year just ended.

One case of smallpox, taken sick on February 7, on the Panama Railroad steamship *Panama*, arriving at Cristobal February 3, was removed to Balboa quarantine on February 10. One practically recovered case of smallpox was received at Balboa quarantine in April from the Pacific Mail steamship *Newport*, this case probably originating in some Mexican port. No other disease of a quarantinable nature arrived at and none occurred in our ports during the year.

Detailed statistics are shown in Table XXVI.

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TABLE I.—*Admissions, deaths, and noneffective rates for employees: Deaths of residents of Panama, Colon, and the Canal Zone.*

ABSOLUTE NUMBERS.

Color.	Average number of employees.	Admissions to hospitals.			Deaths.			Noneffective from sickness.	
		Total.	Disease.	External causes.	Total.	Disease.	External causes.	Days treated.	Constantly noneffective.
Year 1914–15:									
White.....	5,595	2,306	1,940	366	34	17	17	39,449	108.08
Colored....	32,120	5,395	3,974	1,421	184	119	65	107,496	294.51
Total....	37,715	7,701	5,914	1,787	218	136	82	146,945	402.59
Year 1913–14:									
White.....	9,384	6,236	5,107	1,129	61	29	32	100,430	275.15
Colored....	42,868	9,420	6,421	2,999	353	241	112	166,769	456.90
Total....	52,252	15,656	11,528	4,128	414	270	144	267,199	732.05

TABLE I.—*Admissions, deaths, and noneffective rates for employees: Deaths of residents Panama, Colon, and the Canal Zone*—Continued.

PROPORTIONATE NUMBER.[1]

Color.	Average number of employees.	Admissions to hospitals.			Deaths.			Noneffective from sickness.	
		Total.	Disease.	External causes.	Total.	Disease.	External causes.	Days treated.	Constantly noneffective.
Year 1914-15:									
White	5,595	412.15	346.74	65.41	6.08	3.04	3.04	....	19.32
Colored	32,120	167.96	123.72	44.24	5.72	3.70	2.02	....	9.16
Total	37,715	204.18	156.81	47.37	5.78	3.61	2.17	....	10.67
Year 1913-14:									
White	9,384	664.53	544.22	120.31	6.50	3.09	3.41	....	29.32
Colored	42,868	219.74	149.78	69.96	8.23	5.62	2.61	....	10.66
Total	52,252	299.62	220.62	79.00	7.92	5.17	2.75	....	14.01

[1] Annual average per 1,000.

DEATHS OF RESIDENTS OF THE CITIES OF PANAMA, COLON, AND THE CANAL ZONE.

Place.	Population.	Deaths.			Annual average per 1,000.		
		Total.	Disease.	External causes.	Total.	Disease.	External causes.
Year 1914-15:							
Panama	60,382	1,924	1,856	68	31.86	30.74	1.12
Colon	27,815	627	591	36	22.54	21.25	1.29
Canal Zone	35,249	478	415	63	13.56	11.77	1.79
Total	123,446	3,029	2,862	167	24.54	23.19	1.35
Year 1913-14:							
Panama	47,172	1,705	1,616	89	36.14	34.25	1.89
Colon	20,232	517	488	29	25.55	24.12	1.43
Canal Zone	57,955	968	838	130	16.70	14.46	2.24
Total	125,359	3,190	2,942	248	25.45	23.47	1.98

TABLE II.—*Deaths, by age, color, and sex.*

Age.	White.			Colored.			Yellow.			Total.		
	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.
Under 1 year	49	43	92	544	451	995	......	1	1	593	495	1,088
1 to 4 years	16	17	33	184	141	325	1	1	2	201	159	360
5 to 10 years	2	5	7	25	21	46	......	......	......	27	26	53
11 to 20 years	9	4	13	50	64	114	......	......	......	59	68	127
21 to 30 years	33	16	49	279	166	445	6	1	7	318	183	501
31 to 40 years	32	13	45	176	119	295	7	......	7	215	132	347
41 to 50 years	26	6	32	111	76	187	6	......	6	143	82	225
51 to 60 years	21	8	29	83	35	118	2	......	2	106	43	149
61 to 70 years	9	5	14	37	30	67	......	......	......	46	35	81
71 to 80 years	2	4	6	11	23	34	2	......	2	15	27	42
81 to 90 years	4	4	8	6	8	14	2	......	2	12	12	24
Unknown	5	1	6	22	4	26	......	......	......	27	5	32
Total	208	126	334	1,528	1,138	2,666	26	3	29	1,762	1,267	3,029

TABLE III.—*Deaths, by nationality.*

Nations.	Employees.	Nonemployees.	Total.
Antigua	1	21	22
Australia		1	1
Bahama Islands	1	1	2
Barbados	62	278	340
Brazil		1	1
Canada	1		1
Chile		3	3
China		25	25
Colombia	3	74	77
Costa Rica		7	7
Cuba		5	5
Curacao	1	5	6
Demerara		8	8
Denmark	1	2	3
Dominica		5	5
Ecuador		5	5
England		4	4
Fortune Islands	5		5
France		7	7
Germany		6	6
Greece	1	5	6
Grenada	6	16	22
Guadeloupe	2	5	7
Guiana, British	1	2	3
Guatemala		1	1
Haiti	1	4	5
Honduras		1	1
India	3	1	4
Ireland		1	1
Italy		14	14
Jamaica	74	516	590
Japan		3	3
Martinique	11	46	57
Mexico		5	5
Montserrat	1	4	5
Nevis	1	2	3
Nicaragua		5	5
Panama	5	1,500	1,505
Peru		5	5
Portugal		1	1
Russia		1	1
Santo Domingo		2	2
St. Kitts	1	5	6
St. Lucia	3	46	49
St. Thomas	1	9	10
St. Vincent	1	12	13
Spain	3	24	27
Sweden		2	2
Switzerland		1	1
Trinidad	2	22	24
United States	25	56	81
Venezuela		14	14
West Indies	1	8	9
Unknown		14	14
Total	218	2,811	3,029

TABLE IV.—*Causes of deaths of employees of The Panama Canal and Panama Railroad.*

Causes of death.	White.	Colored.	Total.
DISEASE.			
Alcoholism, acute and chronic	1		1
Aneurysm		2	2
Apoplexy	2	2	4
Asthma		1	1
Brain, softening of		2	2
Calculi of the urinary passages		1	1
Cancer of intestines	1		1
Cancer and other malignant tumors of the stomach and liver	1		1
Cancer of organs not specified		1	1
Carbuncle	1		1
Cholecystitis	1		1
Dysentery, unclassified	1	1	2
Encephalitis		1	1
Endocarditis, acute and chronic		2	2
Fever:			
Malarial		2	2
Malarial, estivo-autumnal	2	4	6
Typhoid		1	1
Gangrene		1	1
Gastritis, acute		1	1
Heart, organic disease of	2	8	10
Infection of unknown origin		3	3
Intestinal obstruction		1	1
Kidneys, disease of		1	1
Leuchemia, lymphatic		1	1
Liver, abscess of		2	2
Lungs:			
Abscess of	1		1
Gangrene of		3	3
Meningitis:			
Pneumococcus		1	1
Tuberculous		2	2
Nephritis:			
Acute	1	3	4
Chronic		7	7
Oesophagus, stricture of		1	1
Pericarditis		1	1
Peritonitis, simple		1	1
Pharynx, disease of		1	1
Pneumonia	1	1	2
Pneumonia, lobar		20	20
Septicæmia		2	2
Septicæmia, purulent infection and	1	3	4
Stricture of urethra		1	1
Sudden death		1	1
Tetanus	1	3	4
Tuberculosis:			
Abdominal		2	2
Disseminated		10	10
Of bones and joints		1	1
Of genito-urinary organs		1	1
Miliary		1	1
Pulmonary		10	10
Uremia		1	1
Ulcer, duodenal		2	2
Urethra, disease of		2	2
VIOLENCE.			
Accidental traumatism, various	3	11	14
Drowning, accidental	5	26	31
Dynamite explosions	4	5	9
Electric shock	2	3	5
Homicides		2	2
Lightning		1	1
Railroad accidents	1	14	15
Suicides	2	3	5
Total	34	184	218

TABLE V.—*Death rates among American and white foreign employees.*

	Number of deaths.	Annual average per 1,000.
Average number of white employees from the United States (4,595):		
Disease	13	2.83
External causes	12	2.61
All causes	25	5.44
Average number of white women and children from the United States (3,633):		
Disease	16	4.40
External causes	....	....
All causes	16	4.40
Average number of white employees and their families from the United States (8,228):		
Disease	29	3.52
External causes	12	1.46
All causes	41	4.98
Total number of Americans on the Canal Zone (13,116): [1]		
Disease	33	2.52
External causes	18	1.37
All causes	51	3.89
Average number of white foreign employees (mostly Spaniards) (1,000):		
Disease	4	4.00
External causes	5	5.00
All causes	9	9.00

[1] The figures representing the total number of Americans on the Canal Zone include employees and their families and the officers and men of the United States Army and their families stationed on the Isthmus.

TABLE VI.—*Causes of deaths of employees, and civil population and places where chargeable.*

	Diseases.	Panama.	Colon.	Canal Zone.	Total.
	I. *General diseases.*				
1	Typhoid fever	3	2	....	5
4	Malaria	8	....	1	9
	Malarial fever:				
4a	Estivo-autumnal	22	7	22	51
4b	Tertian	2	....	....	2
4c	Quartan	1	....	....	1
4d	Mixed	....	1	1	2
4e	Undetermined	14	....	1	15
4f	Clinical	31	6	6	43
4g	Cachexia	3	....	....	3
4h	Hemoglobinuric fever, malarial	3	1	1	5
6	Measles	2	1	....	3
8	Whooping cough	1	....	2	3
9	Diphtheria and croup	4	1	1	6
9a	Croup	....	....	1	1
10	Influenza	2	....	....	2
14	Dysentery	20	1	1	22
14a	Entamebic	1	....	....	1
14c	Unclassified	8	2	2	12
17	Leprosy	1	....	....	1
18	Erysipelas	5	....	....	5
19E	Hemoglobinuric fever, unqualified	....	....	1	1
19M	Acute infectious jaundice (Weil's disease)	1	....	....	1
20	Purulent infection and septicæmia	2	3	4	9
20a	Pyemia	1	1	1	3
20b	Septicæmia	11	5	3	19
20c	Pyemia and septicæmia, pneumococcic	3	....	1	4
24	Tetanus	14	2	2	18
26	Pellagra	41	10	4	55
27	Beriberi	7	1	....	8
28	Tuberculosis of the lungs	217	68	22	307
29	Acute miliary tuberculosis	3	1	4	8
30	Tuberculous meningitis	6	3	1	10
31	Abdominal tuberculosis	4	1	3	8
32	Pott's disease	....	1	....	1
	Tuberculosis:				
33a	Of bones and joints	....	....	1	1
34	Of other organs	1	....	1	2
34a	Of the larynx	....	1	....	1
34d	Of the genito-urinary organs	....	....	1	1
35	Disseminated tuberculosis	4	3	14	21
36	Rickets	3	2	....	5

TABLE VI.—*Causes of deaths of employees and civil population and places where chargeable*—Continued.

	Diseases.	Panama.	Colon.	Canal Zone.	Total.
	I. *General diseases*—Continued.				
	Syphilis:				
37A	Primary	1	....	....	1
37C	Tertiary	4	4	1	1
37D	Hereditary	7	3	1	19
37E	Period not stated	5	2	1	8
38A	Gonococcus infection	....	1	....	1
38Aa	Gonorrhea	....	1	....	1
38Ad	Gonorrheal orchitis and epididymitis	....	1	....	1
	Cancer and other malignant tumors:				
39	Of the buccal cavity	3	1	....	4
40	Of the stomach and liver	8	....	3	11
41	Of the peritoneum, intestines, rectum	2	....	1	3
42	Of the female genital organs	15	1	3	19
43	Of the breast	1	1	....	2
45	Of other organs and of organs not specified	6	....	....	6
46	Other tumors (tumors of the female genital organs excepted)	1	1	....	2
47	Acute articular rheumatism	2	....	1	3
48	Chronic rheumatism and gout	1	....	....	1
49	Scurvy	2	....	....	2
50A	Diabetes	1	1	1	3
53a	Leuchemia, lymphatic	1	....	2	3
53b	Hodgkin's disease	1	....	....	1
	Anemia:				
54	Chlorosis	1	....	....	1
54b	Primary, pernicious	1	....	1	2
54c	Secondary, cause not determined	1	....	1	2
55b	Puerpura hemorrhagica	1	....	....	1
	Alcoholism:				
56	Acute or chronic	3	....	....	3
56a	Acute	2	2	1	5
56b	Chronic	4	2	1	7
	II. *Diseases of the nervous system and of the organs of special sense.*				
60	Encephalitis	1	....	2	3
61	Simple meningitis	8	1	....	9
61a	Cerebrospinal fever	2	....	....	2
61b	Pneumococcus meningitis	5	1	....	6
63	Other diseases of the spinal cord	1	....	....	1
63a	Acute anterior poliomyelitis	1	....	....	1
64	Cerebral hemorrhage, apoplexy	19	14	5	38
65	Softening of the brain	4	2	3	9
66	Paralysis without specified cause	6	4	....	10
67	General paralysis of the insane	1	....	....	1
68a	Dementia precox	1	....	....	1
69	Epilepsy	1	1	1	3
70	Convulsions (nonpuerperal) 5 years and over	1	....	1	2
71	Convulsions of infants (under 5 years of age)	11	7	4	22
74	Other diseases of the nervous system	2	....	....	2
74a	Tumor of the brain	1	....	....	1
76	Diseases of the ears	4	....	1	5
	III. *Diseases of the circulatory system.*				
77	Pericarditis	1	2	....	3
78	Acute endocarditis	22	3	3	28
78a	Malignant endocarditis	4	....	....	4
79	Organic diseases of the heart	54	31	18	103
80	Angina pectoris	5	2	....	7
81	Diseases of the arteries, atheroma, aneurysm, etc	....	1	....	1
81a	Aneurysm	2	1	1	4
81b	Arteriosclerosis	18	3	2	23
85	Hemorrhage; other diseases of the circulatory system	1	2	....	3
	IV. *Diseases of the respiratory system.*				
89	Acute bronchitis	61	64	5	130
90	Chronic bronchitis	6	4	....	10
91	Broncho-pneumonia	135	20	23	178
92A	Pneumonia (unqualified)	51	2	8	61
92B	Lobar pneumonia	40	18	14	72
93A	Pleurisy	4	1	....	5
94	Pulmonary congestion, pulmonary apoplexy	2	....	....	2
95	Gangrene of the lungs	4	....	5	9
96	Asthma	6	....	1	7
97	Pulmonary emphysema	1	1	....	2
98	Other diseases of the respiratory system (tuberculosis excepted)	3	2	....	5
98a	Abscess of the lungs	....	1	....	1

TABLE VI.—*Causes of deaths of employees and civil population and places where chargeable*—Continued.

	Diseases.	Panama.	Colon.	Canal Zone.	Total.
	V. *Diseases of the digestive system.*				
99	Diseases of the mouth and adnexa	2			2
99b	Stomatitis	1			1
100	Diseases of the pharynx	1			1
100b	Follicular tonsillitis		1		1
101b	Stricture of the esophagus		1	1	2
102	Ulcer of the stomach	2			2
103	Other diseases of the stomach (cancer excepted)	3			3
103b	Acute gastritis	10	11		21
103c	Chronic gastritis		8		8
103d	Acute indigestion	2	3	1	6
104	Diarrhea and enteritis (under two years)	341	33	46	420
104a	Colitis	17		2	19
105	Diarrhea and enteritis (2 years and over)	10	5	2	17
105a	Colitis	4	1		5
106	Ankylostomiasis	2	1		3
108	Appendicitis and typhlitis	1	1		2
108a	Acute appendicitis	3	1	2	6
109	Hernia, intestinal obstructions	3	1	2	6
109a	Inguinal hernia	1			1
109b	Other hernias	1			1
109c	Intestinal obstruction	9	2	4	15
110	Other diseases of the intestines	2		2	4
110a	Constipation			1	1
110b	Duodenal ulcer		1	1	2
111	Acute yellow atrophy of the liver	1			1
113	Cirrhosis of the liver	11	4		15
114	Biliary calculi	2			2
115	Other diseases of the liver	1			1
115a	Abscess of the liver (unqualified)	11	2	1	14
115b	Abscess of the liver entamoebic			1	1
115c	Cholecystitis		1	2	3
117	Simple peritonitis (nonpuerperal)	9	3	1	13
118	Other diseases of the digestive system (cancer and tuberculosis excepted)	1	1		2
	VI. *Nonvenereal diseases of the genito-urinary system and adnexa.*				
119	Acute nephritis	30	7	9	46
120	Bright's disease (chronic nephritis)	95	48	11	154
122	Other diseases of the kidney and adnexa	5	2	2	9
122c	Pyelo-nephrosis	1	1	2	4
123	Calculi of the urinary passages	1	1	1	3
124	Diseases of the bladder	1			1
124a	Cystitis	1	1		2
125	Diseases of the urethra, urinary abscess, etc	1	1	3	5
125a	Stricture of the urethra, nonvenereal	1			1
126d	Hypertrophy of the prostate	1			1
128	Uterine hemorrhage	1			1
129	Uterine tumor (noncancerous)	1			1
130	Other diseases of the uterus	1		1	2
132	Salpingitis and other diseases of the female genital organs	4	1	1	9
	VII. *The puerperal state.*				
134B	Accidents of pregnancy	1	1	2	4
134Bb	Hyperemesis gravidarum	3			3
134Bc	Abortion	1		1	2
135	Puerperal hemorrhage	2	2	1	5
136	Other accidents of labor	1			1
137	Puerperal septicæmia	7	3	2	12
138	Puerperal albuminaria and convulsions			1	1
138a	Eclampsia	4	3		7
	VIII. *Diseases of the skin and of the cellular tissue.*				
142	Gangrene	2			2
143	Furuncle	1			1
143a	Carbuncle			1	1
144	Acute abscess	1			1
145E	Pemphigus contagiosus	1			1
145T	Other diseases of the skin and adnexa	1		1	2
	IX. *Diseases of the bones and of the organs of locomotion.*				
146	Diseases of the bones (tuberculosis excepted)		1		1
146b	Mastoid abscess	1			1
146c	Osteomyelitis	1		1	2
147	Diseases of the joints (tuberculosis and rheumatism excepted)		1		1
	X. *Malformations.*				
150	Congenital malformations (stillbirth not included)	8	2	3	13

TABLE VI.—*Causes of deaths of employees and civil population and places where chargeable*—Continued.

	Diseases.	Panama.	Colon.	Canal Zone.	Total.
	XI. *Diseases of early infancy.*				
151A	Newborn child	1	....	2	3
151B	Congenital debility, icterus, and sclerema	19	2	7	28
151Ba	Premature birth	40	11	12	63
151Bb	Congenital debility	25	20	13	58
151Bd	Malnutrition	67	47	31	145
152	Other causes peculiar to early infancy (including various consequences of labor)	12	6	5	23
153	Lack of care	1	....	1	2
	XII. *Old age.*				
154	Senility	6	6	5	17
	XIII. *Affections produced by external causes.*				
155	Suicide by poisoning	2	2	....	4
157	Suicide by hanging or strangulation	....	1	2	3
158	Suicide by drowning	....	1	1	2
159	Suicide by firearms	7	3	2	12
160	Suicide by cutting or piercing instruments	1	....	1	2
164	Poisoning by food	....	....	1	1
165	Other acute poisonings	4	....	....	4
166	Conflagration	....	4	....	4
167	Burns (conflagration excepted)	2	....	3	5
168	Absorption of deleterious gases (conflagration excepted)	1	....	....	1
169	Accidental drowning	11	9	21	41
170	Traumatism by firearms	3	....	1	4
172	Traumatism by fall	5	5	1	11
173	Traumatism in mines and quarries	....	....	2	2
174	Traumatism by machines	6	2	....	8
175	Traumatism by other crushings (vehicles, railroads, landslides, etc.)	3	2	3	8
175a	Railroad traumatism	7	4	11	22
175b	Dynamite traumatism	1	....	6	7
177	Starvation	1	....	....	1
180	Lightning	....	....	1	1
181	Electricity (lightning excepted)	....	2	4	6
182	Homicide by firearms	6	....	1	7
183	Homicide by cutting or piercing instruments	1	1	1	3
184	Homicide by other means	....	....	1	1
185A	Fractures (cause not specified)	1	....	....	1
186	Other external violence	6	....	....	6
	XIV. *Ill-defined diseases.*				
187	Ill-defined organic disease	....	....	1	1
188	Sudden death	4	1	....	5
189A	Cause of death not specified or ill defined	36	8	7	51
189Aa	Infections of undetermined origin	3	1	2	6
	Total	1,924	627	478	3,029
	Stillbirths	190	69	58	317
	Grand total	2,114	696	536	3,346

TABLE VII.—*Admissions and deaths of employees and soldiers in the hospitals of The Panama Canal, from all causes, for the fiscal year 1914–15.*

	Diseases.	Employees.				Soldiers.	
		Admissions.		Deaths.		Admissions.	Deaths.
		White.	Black.	White.	Black.		
	I. *General diseases.*						
1	Typhoid fever	1	6	....	1	....	....
1a	Typhoid bacillus carrier	....	1	....	....	....	....
1b	Typhoid prophylaxis	1	....	....	....	....	....
	Malarial fever:						
4a	Estivoautumnal	263	885	2	4	141	....
4b	Tertian	80	139	....	....	102	....
4c	Quartan	2	16	....	....	1	....
4d	Mixed	....	....	....	....	1	....
4f	Clinical	210	521	....	....	116	....
4g	Cachexia	4	5	....	....	....	....

TABLE VII.—*Admissions and deaths of employees and soldiers in the hospitals of The Panama Canal, from all causes, for the fiscal year 1914-15*—Continued.

	Diseases.	Employees.				Soldiers.	
		Admissions.		Deaths.		Admissions.	Deaths.
		White.	Black.	White.	Black.		
	I. *General diseases*—Continued.						
4h	Hemoglobinuric fever, malarial	4				1	
5b	Vaccinia	1	1				
6	Measles	2	67			3	
7	Scarlet fever		1				
9	Diphtheria and croup		1				
10	Influenza	49	39			26	
13	Cholera nostras					2	
14	Dysentery	3	7	1			
14a	Entamebic	1	5				
14b	Bacillary	2	5				
14c	Unclassified	1	33		1		
17	Leprosy		2				
18	Erysipelas	4	1			1	
19A	Dengue	3				1	
19B	Chicken pox		8				
19C	German measles					1	
19D	Mumps	24	267			32	
19I	Yaws	1	2				
19K	Filariasis		4				
19L	Malta fever		1				
19M	Acute infectious jaundice (Weil's disease)	1	3			5	
19O	Other epidemic diseases	2					
20	Purulent infection and septicæmia	4	4	1	5	1	
20b	Septicæmia		1				
24	Tetanus	1	2	1	3		
26	Pellagra		5				
28	Tuberculosis of the lungs	14	82		10	2	
29	Acute miliary tuberculosis		1		1		
30	Tuberculous meningitis		2		2		
31	Abdominal tuberculosis		7		2	1	
	Tuberculosis:						
33a	Of bones and joints		1		1		
34	Of other organs		1				
34b	Of the skin		1				
34c	Of the lymph glands		1			1	
34d	Of the genito-urinary organs		1		1		
34e	Tuberculous abscess		2				
35	Disseminated tuberculosis		4		10		
	Syphilis:						
37A	Primary	4	8			5	
37B	Secondary	24	41			23	
37C	Tertiary	9	83			10	
37E	Period not stated	10	89			12	
38A	Gonococcus infection	1	2			1	
38Aa	Gonorrhea	49	114			166	
38Ab	Gonorrheal arthritis	4	21			7	
38Ac	Gonorrheal bubo	3	10			7	
38Ad	Gonorrheal orchitis and epididymitis	18	20			20	
38Ae	Gonorrheal opthalmia		5				
38B	Soft chancre	20	73			77	
38Ba	Adenitis chancroidal	10	41			54	
	Cancer and other malignant tumors:						
39	Of the buccal cavity	1				2	
40	Of the stomach and liver	2		1			
41	Of the peritoneum, intestines, rectum	1					
44	Of the skin		1			2	
45	Of other organs and of organs not specified.	1	7		1		
46	Other tumors (tumors of the female genital organs excepted)	6	6			5	
47	Acute articular rheumatism	8	10			7	
48	Chronic rheumatism and gout	8	17			7	
50A	Diabetes	1	1				
53a	Leuchemia, lymphatic		1		1		
53b	Hodgkin's disease		3				
	Anemia:						
54b	Primary, pernicious					1	
54c	Secondary, cause not determined	1	1			1	
55	Other general diseases	13	12			5	
55b	Purpura hemorrhagica		1				
	Alcoholism:						
56	Acute or chronic	3				1	
56a	Acute	21	2			17	
56b	Chronic	3		1			
56c	Alcohol psychosis	1	3			3	
59	Other chronic poisonings	2					

TABLE VII.—*Admissions and deaths of employees and soldiers in the hospitals of The Panama Canal, from all causes, for the fiscal year 1914–15*—Continued.

	Diseases.	Employees.				Soldiers.	
		Admissions.		Deaths.		Admissions.	Deaths.
		White.	Black.	White.	Black.		
	II. *Diseases of the nervous system and of the organs of special sense.*						
60	Encephalitis		1		1		
61	Simple meningitis				1	1	
61b	Pneumococcus meningitis		1		1		
62	Locomotor ataxia					1	
63	Other diseases of the spinal cord	1	1			1	
64	Cerebral hemorrhage, apoplexy	2	3	2	1		
65	Softening of the brain		5		2		
66	Paralysis without specified cause	1	8			1	
68	Other forms of mental alienation	7	15			8	
68a	Dementia precox	4	16			6	
69	Epilepsy	2	12			5	
70	Convulsions (nonpuerperal) 5 years and over		1				
73A	Hysteria	1				6	
73B	Neuralgia	4	4			6	
73C	Neuritis	25	13			6	
74	Other diseases of the nervous system	6	8			4	
74b	Neurasthenia	15	2			16	
75	Diseases of the eye and their adnexa	55	137			45	
75a	Follicular conjunctivitis		4			1	
76	Diseases of the ears	38	34			80	
	III. *Diseases of the circulatory system.*						
77	Pericarditis		4				
78	Acute endocarditis		1		1	1	1
78a	Malignant endocarditis		1		1		
79	Organic diseases of the heart	11	27	1	4	3	
81a	Aneurysm		1		1		
81b	Arteriosclerosis	4	2				
82	Embolism and thrombosis	1					
83	Diseases of the veins (varices, hemorrhoids, phlebitis, etc.)	9	5			8	
83a	Hemorrhoids	12	29			21	
83b	Varices					1	
83c	Varicocele	12	3			9	
83d	Phlebitis	2	1				
84	Diseases of the lymphatic system (lymphangitis, etc.)	4	3			7	
84a	Lymphadenitis (nonvenereal)	26	45			48	
85	Hemorrhage: other diseases of the circulatory system		2			1	
	IV. *Diseases of the respiratory system.*						
86	Diseases of the nasal fossæ	43	10			28	
86a	Adenoid vegetations		1				
86b	Myiasis of nasal fossæ and sinuses		1				
87a	Laryngitis	1	2			4	
88	Diseases of the thyroid body	1	1			2	
89	Acute bronchitis	48	45			26	
90	Chronic bronchitis	13	11			3	
91	Broncho-pneumonia	1	6	1			
92A	Pneumonia (unqualified)	1	6				
92B	Lobar pneumonia	4	57		21	3	
93A	Pleurisy	13	56			5	
93B	Empyema	2	3				
94	Pulmonary congestion, pulmonary apoplexy	1	1				
95	Gangrene of the lungs			1	3		
96	Asthma	4	10		1		
97	Pulmonary emphysema	1					
98	Other diseases of the respiratory system (tuberculosis excepted)	3	1			7	
98a	Abscess of the lungs	3	1				
98b	Hay fever	1					
	V. *Diseases of the digestive system.*						
99	Diseases of the mouth and adnexa	4	2			7	
99a	Diseases of the teeth and gums	7	9			11	
99b	Stomatitis		1			1	
100	Diseases of the pharynx	10	13		1	18	
100a	Pharyngitis	2	8			2	
100b	Follicular tonsillitis	42	30			94	
101	Diseases of the esophagus	1	1				
101a	Foreign body in the esophagus	1	1				
101b	Stricture of the esophagus				1		
102	Ulcer of the stomach	4	4			1	
103	Other diseases of the stomach (cancer excepted)	6					

TABLE VII.—*Admissions and deaths of employees and soldiers in the hospitals of The Panama Canal, from all causes, for the fiscal year 1914–15*—Continued.

	Diseases.	Employees.				Soldiers.	
		Admissions.		Deaths.		Admissions.	Deaths.
		White.	Black.	White.	Black.		
	V. *Diseases of the digestive system*—Continued.						
103b	Acute gastritis	6	4				
103c	Chronic gastritis	6	1			1	
103d	Acute indigestion	7	13			1	
104a	Colitis	3	2			2	
105	Diarrhea and enteritis (2 years and over)	14	24			16	
105a	Colitis	4	7			2	
106	Ankylostomiasis	1	17				
107	Intestinal parasites	2	5				
107a	Ascariasis		3				
108	Appendicitis and typhlitis					1	
108a	Acute appendicitis	35	7			41	1
108b	Chronic appendicitis	25	4			21	
109	Hernia, intestinal obstruction					1	
109a	Inguinal hernia	36	70			19	
109b	Other hernias	2	1			4	
109c	Intestinal obstruction				1	1	
110	Other diseases of the intestines	78	14			33	
110a	Constipation	26	14			4	
110b	Duodenal ulcer	2	2		2	1	
110c	Sprue	1					
111	Acute yellow atrophy of the liver		1				
113	Cirrhosis of the liver	1				1	
114	Biliary calculi	1					
115	Other diseases of the liver	9	6			4	
115a	Abscess of the liver (unqualified)		1		1	1	
115b	Abscess of the liver entamebic		3		1		
115c	Cholecystitis	13	1	1		2	
116	Diseases of the spleen		2				
117	Simple peritonitis (nonpuerperal)	2					
118	Other diseases of the digestive system (cancer and tuberculosis excepted)	4	1			2	
	VI. *Nonvenereal diseases of the genito-urinary system and adnexa.*						
119	Acute nephritis	1	7	1	2	1	1
120	Bright's disease (chronic nephritis)	11	28		8	1	
122	Other diseases of the kidney and annexa	5	5		1	3	
122c	Pyelo-nephrosis	5	9				
123	Calculi of the urinary passages	5	2		1	2	
124	Diseases of the bladder	1	6				
124a	Cystitis	6	4			4	
125	Diseases of the urethra, urinary abscess, etc.	6	17	1	2	5	
125a	Stricture of the urethra, nonvenereal	3	22			2	
126	Diseases of the prostate	2	2				
126a	Acute prostatitis		1				
126b	Chronic prostatitis	2					
126d	Hypertrophy of the prostate	1					
127	Nonvenereal diseases of the male genital organs	12	53			4	
127b	Hydrocele	8	24			2	
128	Uterine hemorrhage (nonpuerperal)	1	1				
129	Uterine tumor (noncancerous)	1	1				
130	Other diseases of the uterus	3	1				
130a	Metritis	2					
132	Salpingitis and other diseases of the female genital organs	1	2				
133	Nonpuerperal diseases of the breast (cancer excepted)		1				
	VII. *The puerperal state.*						
134Bc	Abortion		2				
	VIII. *Diseases of the skin and cellular tissue.*						
142	Gangrene		3		1		
143	Furuncle	13	13			7	
143a	Carbuncle	8	2	1		4	
144	Acute abscess	35	74			37	
144a	Phlegmon and cellulitis	24	15			5	
145E	Pemphigus contagiosus	1	1			2	
145G	Ground itch		1				
145I	Elephantiasis		1				
145K	Dhobie itch	6	4			18	
145M	Ulcer of the skin	5	23			1	
145O	Tropical ulcer	1	1				
145P	Ulcerating granuloma of the pudenda		1				
145Q	Impetigo contagiosa	3	2			8	

TABLE VII.—*Admissions and deaths of employees and soldiers in the hospitals of The Panama Canal, from all causes, for the fiscal year 1914–15*—Continued.

	Diseases.	Employees.				Soldiers.	
		Admissions.		Deaths.		Admissions.	Deaths.
		White.	Black.	White.	Black.		
	VIII. *Diseases of the skin and cellular tissue*—Continued.						
145R	Urticaria	2				1	
145S	Ingrowing nail	10	1			16	
145T	Other diseases of the skin and adnexa	19	20			42	
	IX. *Diseases of the bones and of the organs of locomotion.*						
146	Diseases of the bones (tuberculosis excepted)	13	5			2	
146a	Caries (nontuberculous)		1				
146b	Mastoid abscess	1	3				
146c	Osteomyelitis	3					
146d	Periostitis	2	2				
147	Diseases of the joints (tuberculosis and rheumatism excepted)	2	2				
147a	Ankylosis		1			2	
147b	Arthritis	9	25			5	
147c	Synovitis	5	1			10	
148	Amputations	3	42		1		
149	Other diseases of the organs of locomotion	27	28			21	
	X. *Malformations.*						
150	Congenital malformations (stillbirth not included)	1	1			7	
	XII. *Old age.*						
154	Senility		2				
	XIII. *Affections produced by external causes.*						
	Suicide:						
155	By poisoning		1				
159	By firearms	1		1			
160	By cutting or piercing instruments	1					
164	Poisoning by food	16	21			3	
165	Other acute poisonings	4	4			2	
166	Conflagration		1				
167	Burns (conflagration excepted)	6	34		1	3	
168	Absorption of deleterious gases (conflagration excepted)	1	1				
	Traumatism:						
170	By firearms	2	8			11	
171	By cutting or piercing instruments	21	173			16	
172	By fall	29	138	1	1	6	
173	In mines and quarries		29				
174	By machines	10	103		3	1	
175	By other crushings (vehicles, railroads, landslides, etc.)	41	147		5	4	
175a	Railroad traumatism	5	51		4	5	
175b	Dynamite traumatism	2	15	1			
175c	Traumatism by landslides	4	11		1		
176	Injuries by animals		3				
177	Starvation		1				
179	Effects of heat	1				2	
179b	Heat exhaustion	1	1				
180	Lightning		1				
181	Electricity (lightning excepted)	3					
183	Homicide by cutting or piercing instruments	1	1				
185A	Fractures (cause not specified)	35	53			20	
185B	Dislocations	2	5			4	
185C	Sprains	27	34			20	
186	Other external violence	152	587			51	
	XIV. *Ill-defined diseases.*						
187	Ill-defined organic disease	6				2	
189A	Cause of death not specified or ill-defined		1		1		
189Aa	Infections of undetermined origin	19	13		3	2	
189Ba	No disease	6	13			16	
189Bb	Feigned disease		2			2	
	Total	2,304	5,495	19	123	1,909	3

TABLE VIII.—*Consolidated hospital report.*

	Remaining July 1.		Admitted.		Died.		Discharged.		Transferred.		Remaining June 30.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
ANCON HOSPITAL.												
Panama Canal employees	82	228	1,748	3,666	10	77	1,768	3,608	11	35	41	173
Panama Railroad employees	15	55	249	905	4	23	252	862	1	11	7	64
Panama pay patients	....	2	......	6	....	....	......	2	....	6	....	....
Other pay patients	180	69	3,614	1,011	48	115	3,587	923	20	6	139	36
Charity patients	25	4	252	418	6	55	260	312	2	23	9	33
Total	302	358	5,863	6,006	68	270	5,867	5,707	34	81	196	306
Insane department:												
Panama Canal employees	7	22	4	13	....	1	2	11	4	13	5	10
Panama Railroad employees	....	10	......	5	....	1	......	2	....	10	....	2
Panama pay patients	13	157	10	91	2	25	7	25	2	34	13	164
Other pay patients	4	6	26	5	1	....	17	3	5	6	6	2
Charity patients	9	75	3	16	....	5	2	9	3	33	7	44
Total	33	270	43	130	3	32	28	50	14	96	31	222
Grand total	335	628	5,906	6,136	71	302	5,895	5,757	48	177	227	528
Corozal farm: Panama Canal employees	7	43	7	40	....	....	4	34	1	9	9	40
Chronic ward: Charity patients	....	26	......	51	....	....	......	50	....	1	....	26
COLON HOSPITAL.												
Panama Canal employees	....	21	234	556	3	10	195	437	32	122	4	8
Panama Railroad employees	3	13	76	350	1	10	68	239	10	105	....	9
Panama pay patients	3	1	44	125	3	11	18	33	24	82	....	....
Other pay patients	1	1	309	134	5	12	254	86	45	32	8	5
Charity patients	....	1	65	112	6	5	46	65	13	41	....	2
Total	7	37	728	1,277	18	48	581	860	124	382	12	24
PALO SECO LEPER ASYLUM.												
Panama pay patients	2	30	1	10	....	5	......	1	....	....	3	33
Charity patients	2	15	......	3	....	....	......	1	....	....	2	18
Total	4	45	1	13	....	5	......	2	....	....	5	51
GRAND TOTALS.												
Panama Canal employees	96	314	1,993	4,275	13	88	1,969	4,090	48	179	69	231
Panama Railroad employees	18	78	325	1,260	5	34	320	1,103	11	126	7	75
Panama pay patients	16	190	55	232	5	41	25	61	26	122	16	197
Other pay patients	187	76	3,949	1,150	54	127	3,858	1,012	70	44	153	43
Charity patients	36	121	320	600	12	65	308	437	18	98	18	123
Total	353	779	6,642	7,517	89	355	6,480	6,703	173	569	253	669

TABLE IX.—*Consolidated report of employees treated in quarters.*

Stations.	Remaining July 1.		Admitted.		Died.		Discharged.		Transferred.		Remaining June 30.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
Naos Island	....	2	4	53	....	1	4	40	....	14	....	....
Ancon	2	7	1,164	244	....	....	1,128	243	24	8	14	....
Balboa	1	1	661	284	....	....	554	174	102	110	6	1
Corozal	1	....	667	54	....	....	626	48	39	6	3	....
Pedro Miguel	1	....	146	2	....	....	132	2	12	....	3	....
Paraiso	....	....	182	11	....	....	153	8	29	2	....	1
Culebra	1	3	92	163	....	1	92	156	1	9	....	....
Empire	1	3	48	19	....	....	49	22	....	....	....	....
Gamboa	....	....	1	5	....	....	1	4	....	1	....	....
Gatun	2	2	180	84	....	....	169	79	11	5	2	2
Colon	14	29	854	722	....	....	861	725	1	5	6	21
Margarita Point	....	....	3	13	....	....	2	3	1	10	....	....
Total	23	47	4,002	1,654	.. .	2	3,771	1,504	220	170	34	25

TABLE IX.—*Consolidated report of employees treated in quarters*—Continued.

CONSOLIDATED REPORT OF DAYS LOST IN QUARTERS.

Stations.	White.	Colored.	Total.
Naos Island	10	97	107
Ancon	2,973	905	3,878
Balboa	1,548	490	2,038
Corozal	1,344	97	1,441
Pedro Miguel	468	7	475
Paraiso	461	33	494
Culebra	241	367	608
Empire	100	151	251
Gamboa	1	16	17
Gatun	457	419	876
Colon	2,004	4,480	6,484
Margarita Point	6	9	15
Total	9,613	7,071	16,684

TABLE X.—*Consolidated hospital and employees treated in quarters report.*

	Remaining July 1.		Admitted.		Died.		Discharged.		Transferred.		Remaining June 30.	
	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.	White.	Colored.
Hospitals	353	779	6,642	7,517	89	355	6,480	6,703	173	569	253	669
Quarters	23	47	4,002	1,654	......	2	3,771	1,504	220	170	34	25
Total	376	826	10,644	9,171	89	357	10,251	8,207	393	739	287	694

	White.	Colored.	Total.
Total admissions to hospitals, excluding Corozal farm and chronic ward	6,635	7,426	14,061
Total admissions of employees to quarters	4,002	1,654	5,656
Total	10,637	9,080	19,717
Less number of patients transferred from quarters to hospitals, and between hospitals, whose admissions are duplicated in above figures	392	729	1,121
Net admissions to hospitals and quarters	10,245	8,351	18,596
Net admissions of employees to hospitals and quarters	6,035	6,683	12,718
Annual average per thousand of admissions of employees to hospitals and quarters	1,078.64	208.06	337.21

CONSOLIDATED DISPENSARY REPORT OF ALL CASES TREATED BUT NOT EXCUSED.

Stations.	Employees.			Nonemployees.			Total.		
	White.	Colored.	Total.	White.	Colored.	Total.	White.	Colored.	Total.
Naos Island	1,541	13,636	15,177	1	5	6	1,542	13,641	15,183
Ancon	24,669	36,105	60,774	17,859	20,449	38,308	42,528	56,554	99,082
Balboa	40,810	45,822	86,632	4,874	3,227	8,101	45,684	49,049	94,733
Corozal	19,970	18,289	38,259	11,238	1,925	13,163	31,208	20,214	51,422
Pedro Miguel	6,177	11,523	17,700	7,012	1,809	8,821	13,189	13,332	26,521
Paraiso	11,018	23,105	34,123	5,958	6,686	12,641	16,976	29,791	46,767
Culebra	3,080	4,841	7,921	2,735	3,297	6,032	5,815	8,138	13,953
Empire	1,101	1,634	2,735	694	635	1,329	1,795	2,269	4,064
Gamboa	686	1,981	2,667	365	4,236	4,601	1,051	6,217	7,268
Gatun	8,504	14,974	23,478	10,217	6,631	16,848	18,721	21,605	40,326
Colon	8,399	20,188	28,587	6,619	6,626	13,245	15,018	26,814	41,832
Margarita Point	840	2,118	2,958	....	....	....	840	2,118	2,958
Total	126,795	194,216	321,011	67,572	55,526	123,098	194,367	249,742	444,109

TABLE XI.—*Average number of employees constantly sick in hospitals and quarters.*

HOSPITALS.

	White.	Colored.	Total.
Ancon Hospital	75.23	255.82	331.05
Colon Hospital	6.50	19.33	25.83
Total	81.73	275.15	356.88

QUARTERS.

	White.	Colored.	Total.
Naos Island	0.03	0.27	0.30
Ancon	8.15	2.48	10.63
Balboa	4.24	1.34	5.58
Corozal	3.69	.26	3.95
Pedro Miguel	1.28	.02	1.30
Paraiso	1.26	.09	1.35
Culebra	.66	1.01	1.67
Empire	.27	.41	.68
Gamboa	.01	.04	.05
Gatun	1.25	1.14	2.39
Colon	5.49	12.28	17.77
Margarita Point	.02	.02	.04
Total	26.35	19.36	45.71

AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK.

	White.	Colored.	Total.
Hospitals	81.73	275.15	356.88
Quarters	26.35	19.36	45.71
Total	108.08	294.51	402.59

AVERAGE NUMBER OF EMPLOYEES CONSTANTLY SICK PER 1,000.

	White.	Colored.	Total.
Hospitals	14.61	8.56	9.46
Quarters	4.71	.60	1.21
Total	19.32	9.16	10.67

TABLE XII.—*Average length of stay in hospitals or quarters for each admission of sick employees.*

	White.	Colored.	Total.
Hospitals:			
Ancon Hospital	13.35	19.88	17.89
Colon Hospital	7.67	7.64	7.65
Total	12.61	17.87	16.31
Quarters:			
Noas Island	2.50	1.76	1.81
Ancon	2.58	3.61	2.76
Balboa	2.36	1.73	2.17
Corozal	2.02	1.80	2.00
Pedro Miguel	3.25	3.50	3.25
Paraiso	2.53	3.30	2.57
Culebra	2.59	2.21	2.35
Empire	2.04	6.86	3.54
Gamboa	1.00	3.20	2.83
Gatun	2.54	4.98	3.32
Colon	2.32	6.14	4.07
Margarita Point	2.00	.69	.94
Total	2.41	4.22	2.94

TABLE XIII.—*Subsistence and operating expenses.*

Subsistence expenses:	
Number of days' rations issued to patients	335,183
Cost of rations issued to patients	$87,807.69
Cost of subsistence per patient per day	$0.261
Operating expenses:	
Number of days' relief furnished patients	335,183
Cost of operation	$459,704.28
Cost per capita per day	$1.371
Cost of operation with amount received from outside patients, etc., deducted	$199,060.15
Cost per capita per day with above deduction	$0.593
Cost of dispensaries	$47,718.51

FINANCIAL STATEMENT.

	Health Dept. expenditures fiscal year 1913–14.	Health Dept. expenditures fiscal year 1914–15.
Administration (6 months)[1]	$47,805.72	$10,504.08
Medical storehouse (6 months)[1]	7,090.20	4,257.10
Ancon Hospital	521,043.70	404,894.90
Colon Hospital	77,946.19	42,006.35
Taboga Sanitarium	15,059.79	....
Santo Tomas Hospital	11,626.33	11,131.87
Other hospitals and dispensaries	124,597.62	75,529.96
Quarantine service	52,787.18	54,975.87
Sanitation, proper, Panama	35,651.15	37,556.63
Disposal of garbage, street cleaning, Panama	42,953.94	54,060.41
Sanitation, proper, Colon	25,722.67	28,014.87
Disposal of garbage, street cleaning, Colon	20,686.78	23,675.14
Sanitation, proper, Canal Zone	204,361.74	113,832.29
Disposal of garbage, etc., Canal Zone	44,929.28	17,034.78
Construction and repair of buildings	26,278.28	14,867.94
Operation of Corozal farm	12,533.04	30,766.59
Total	1,271,073.61	923,108.78

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[1] Cost of administration (chief health office) and of medical storehouse prorated into operating accounts since Jan. 1, 1915.

TABLE XIV.—*Patients other than employees treated in hospitals, including Palo Seco Leper Asylum, and amounts received for their treatment.*

	Remaining July 1.	Admitted.	Total.	Number of days treated.	Amount
Paid for by Panama Republic:					
Insane	172	107	279	65,191	$48,941.85
Colon Hospital	4	169	173	664	1,526.69
Lepers	32	11	43	11,694	8,739.75
Total	208	287	495	77,549	59,208.29
For whom department of civil government pays $2,400 per year (charity)	156	886	1,042	48,634	2,400.00
Outside pay patients	76	1,199	1,275	12,315	69,824.99
Families of employees, etc. (Zone)	127	1,991	2,118	34,938	49,778.62
Soldiers	60	1,909	1,969	25,627	39,874.66
Residents of Panama, emergency charity cases	1	34	35	209	....
Operations [1]	....	....	....	....	20,161.73
Total	628	6,306	6,934	199,272	241,248.29

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[1] The amount received for operations is for the first 4 months of the year, since which time the amounts received from this source are included in the amounts received from the different classes of patients mentioned above.

TABLE XV.—*Surgical operations performed in hospitals.*

	Number.	Died.
Amputations:		
Shoulder	3	2
Forearm	3	
Hip joint	1	1
Thigh	1	
Leg	13	2
Foot	5	
Digits, multiple	41	1
Leg, double	4	
Operations on bones:		
Craniectomy, decompressive	7	2
Craniectomy, exploratory	1	
Laminectomy	2	2
Osteectomy	20	1
Resection of shoulder	1	
Resection of wrist	1	
Wiring of fractures, simple	58	
Wiring of fractures, compound	28	1
Adenectomy:		
Cervical	34	
Axillary	1	
Inguinal, single	213	
Inguinal, double	62	
Femoral	16	
Herniotomy:		
Inguinal, single	118	
Inguinal, double	23	
Femoral	4	
Ventral	11	
Combined (any two of the above)	2	
Strangulated	8	
Genito-urinary tract:		
Nephrotomy	1	
Nephrectomy	2	
Nephropexy	2	
Perinephritic abscess, drainage of	1	
Ureterotomy	2	
Cystotomy	2	
Urethrotomy, internal	29	
Urethrotomy, external	32	1
Prostatectomy	6	1
Varicocele, radical cure	16	
Hydrocele, single, radical cure	37	
Hydrocele, double, radical cure	6	
Orchidectomy	3	
Epididyotomy	107	
Amputation of scrotum	17	
Curetage uteri	86	1
Perineoplasty	6	
Trachelorrhaphy	8	
Vaginal sections	1	
Vaginal punctures	6	1
Obstetrical:		
Cesarian section, abdominal	3	
Cesarian section, vaginal	1	
High forceps	3	
Low forceps	21	
Version	2	
Perineorrhaphy	13	
Thorax:		
Thoracotomy	8	1
Thoracoplasty	2	
Pneumothoracotomy	1	1
Excision of breast	2	
Excision of breast and axilla	2	1
Rectum:		
Hemorrhoids, radical cure	99	
Fistula in anus, excision of	5	
Prolapsus rectum, radical excision	2	
General:		
Thyreoidectomy	7	
Varicose veins, excision of	12	
Tenorrhaphy	12	
Excision of surface neoplasms	40	1
Gunshot wound of soft parts, operation for	1	
Stab wound of soft parts, operation for	2	
Extensive injuries to soft parts, operation for	2	
Plastic operation for congenital defect	4	1
Plastic operation for severe injuries	15	2
Plastic operation for effects of disease	15	
Skin graft	16	
Laparotomy:		
For general peritonitis	3	1
For tuberculous peritonitis	4	2
For intestinal obstruction	2	2
Exploratory	11	3
Gastrotomy	1	1
Gastro-enterostomy	8	1
Entero-enterostomy	1	
Enterectomy	3	2
Appendicectomy	186	1
Appendicectomy with local peritonitis	17	2
Appendicectomy with general peritonitis	3	
Appendicostomy	1	
Cecostomy	1	1
Colostomy	1	
Resection of rectum	1	
Cholecystostomy	13	1
Cholecystectomy	5	1
Abscess of liver, laparo-hepatotomy for	7	2
Abscess of liver, thoraco-hepatotomy for	3	
Splenectomy	3	1
Pan-hysterectomy	4	
Supravaginal hysterectomy	50	1
Hysteromyomectomy	18	
Myomectomy	3	
Salpingectomy, single	7	
Salpingectomy, double	6	
Salpingo-oophorectomy	10	1
Ovarian cystectomy	1	
Oophorectomy	1	
Suspensio-uteri	31	
Plastic operation for chronic pelvic peritonitis	19	
For ectopic gestation	4	
For trauma:		
General peritonitis	4	1
Hematoperitoneum	1	1
Rupture of liver	1	1
Rupture of spleen	2	
Stab wound of abdomen	1	
Major operations, various others	166	
Minor operations, various	1,442	3
Total	3,386	52

TABLE XVI.—*Operations and work performed in eye, ear, nose, and throat clinics.*

Operations.	Number.	Died.
Abscess, alveolar	1	
Abscess, brain, drainage of	1	
Adenectomy	92	
Advancement of internal rectus	1	
Capsulectomy	3	
Cautery to ulcer of nose	1	
Enucleation	2	
Evisceration	7	
Excision of endothelioma of nose	1	
Expression for trachoma	3	
Extraction of cataract	22	
Fracture of nose	2	
Iridectomy	16	
Lachrymal gland, excision	1	
Lachrymal duct dilated	1	
Mastoidectomy	11	1
Ossiculectomy	1	
Plastic on eye ball	1	
Plastic on eye lid	4	
Plastic, face	1	
Plastic on nose	3	
Ptergium, excision	6	
Ptergium, transplantation	38	
Resection, external rectus	1	
Removal of nasal polyp	6	
Removal of foreign body from esophagus	1	
Resection, internal rectus	1	
Rhinoplasty	1	
Sarcoma of nose, excision	1	
Sinusotomy	8	
Submucous resection of nasal septum	72	
Sublingual abscess, incised	2	
Tenotomy	1	
Tonsillectomy	151	
Turbinectomy	9	
Various minor operations	325	
Total	798	
Refractions	2,553	
Outside cases treated	9,249	
Grand total	12,600	1

TABLE XVII.—*Consolidated ward laboratory report of all hospitals.*

Blood examinations	10,488
Estivoautumnal	1,865
Tertian	419
Mixed tertian and estivoautumnal	15
Quartan	31
Differential blood counts	656
Leucocyte counts	1,217
Red blood counts	89
White blood counts	30
Hemoglobin estimations	803
Stool examinations	6,338
Ascaris lumbricoides	169
Uncinaria ova	706
Tricocephalus dispar	401
Strongyloides intestinalis	231
Ameba	37
Entamoeba	9
Ciliated monads	140
Bilharzia	2
Pus and blood	885
Balantidium coli	9
Entamoeba, histolytica and tetragena	35
Guaiac tests	116
Cercomonas, intestinalis	10
Bathriocephalus	1
Urine examinations	20,647
Albumen	5,684
Albumen and casts	3,970
Sugar	96
Pus and blood	4,228
Indican	456
Epithelium	1,406
Bile	235
Trichomonas vaginalis	7
Hemin crystals	13
Guaiac tests	106
Ciliated monads	13
Sputum examinations	2,143
Tubercle bacilli	269
Pus cells	2
Miscellaneous:	
Examinations of pleural effusions	2
Examinations of various smears and discharges	368
Examinations of spinal fluid	31
Examinations of vaginal and urethral discharges	194
Examinations of the eye	16

TABLE XVIII.—*Ancon hospital.*

NATIONALITY OF PATIENTS.

Class.	Number treated.	Americans.		Other nations.	
		White.	Colored.	White.	Colored.
Panama Canal employees	5,724	1,120	6	541	4,057
Panama Railroad employees	1,224	150		100	974
Panama pay patients	8				8
Other pay patients	4,874	2,968	1	806	1,099
Charity patients	699	179		56	464
Total	12,529	4,417	7	1,503	6,602
INSANE DEPARTMENT.					
Panama Canal employees	46	1		11	34
Panama Railroad employees	15				15
Panama pay patients	271			20	251
Other pay patients	41	23		2	16
Charity patients	103	8		5	90
Total	476	32		38	406
Grand total	13,005	4,449	7	1,541	7,008

Number of days' relief furnished patients	292,740
Cost of subsistence per patient per day	$0.257

TABLE XIX.—*Colon Hospital.*

NATIONALITY OF PATIENTS.

Class.	Number treated.	Americans.		Other nations.	
		White.	Colored.	White.	Colored.
Panama Canal employees	811	122	....	107	582
Panama Railroad employees	442	57	....	26	359
Panama pay patients	173	13	....	35	125
Other pay patients	445	185	....	127	133
Charity patients	178	42	....	28	108
Total	2,049	419	....	323	1,307

Number of days' relief furnished patients	14,589
Cost of subsistence per patient per day	$0.337

NOTE.—Operations at Ancon and Colon Hospitals (see report of all surgical operations); laboratory reports of Ancon and Colon Hospitals (see consolidated ward laboratory report).

TABLE XX.—*Palo Seco Leper Asylum.*

NATIONALITY OF PATIENTS.

Class.	Number treated.	Americans.		Other nations.	
		White.	Colored.	White.	Colored.
Panama pay patients	44	....	....	3	41
Charity patients	18	....	....	2	16
Total	62	....	....	5	57

Number of days' relief furnished patients	17,798
Cost of subsistence per patient per day	$0.266

TABLE XXI.—*Santo Tomas Hospital.*

Class.	Remaining July 1.	Admitted.	Died.	Discharged.	Remaining June 30.
Pay patients	44	1,291	27	1,278	30
Charity patients	318	10,599	826	9,687	404
Total	362	11,890	853	10,965	434

Average number of days' treatment per patient	13.64
Average number of patients constantly sick	441.57
Number of days' relief furnished patients	161,174
Cost of subsistence per patient per day	$0.263

TABLE XXII.—*Santo Tomas Hospital*—Continued.

NATIONALITY OF PATIENTS.

Class.	Number treated.	Americans.		Other nations.	
		White.	Colored.	White.	Colored.
Pay cases	1,335	39	....	499	797
Charity patients	10,917	53	2	1,099	9,763
Total	12,252	92	2	1,598	10,560

TABLE XXII.—*Santo Tomas Hospital*—Continued.

OPERATIONS.

	Number.	Died.
Major	1,160	47
Minor	180	....
Total	1,340	47

DISPENSARY.

Class.	White.	Colored.	Total.
Natives	899	5,566	6,465
Foreigners	1,138	5,742	6,880
Total	2,037	11,308	13,345

TABLE XXIII.—*Board of health laboratory.*

Bacteriological examinations:	
Water	2
Milk	14
Fluids and exudates	106
Blood cultures	160
Throat cultures (diphtheria suspects)	260
Cultures from autopsies	57
Cultures from eye	3
Stool cultures	916
Urine cultures	1,033
Sputum	47
Pus	5
Knee-joint fluid	4
Spinal fluid	8
Various smears and specimens	4
Fluid from chest	1
Fluid from pleural cavity	2
Fluid from gall bladder	1
For quarantine officer	2
Curetage	2
Placenta	1
Lymph node	1
Autopsy material (veterinary)	3
Oysters	2
Feces for uncinaria	2
Rats	1
Tissue (curettings)	1
Yaws suspect	1
Fresh meat for B. anthracis	35
Spleens (bovine) for B. anthracis	57
Examinations:	
Provisions	3
Leper suspects	21
Animals	68
Rats	10,659
Microscopic, for chief quarantine officer	17
Blood of employees for malaria	171
Stomach contents	2
Fabrics for superintendent	2
Chemical examinations:	
Pancreatic cyst	1
Oleum ricini	1
Boric acid	1
Chloral	1
Carbolic acid	1
Specimens for division of police	2
Urinary calculus	3
Stools	2
Belladonna suppositories	1
Alcoholic beverages	7
Stomach contents	19
Urine	992
Various liquids, fluids, etc	5
Various metals	1
Chemical examinations—Continued.	
Sugar cane	2
Cottonseed hulls and meal	2
Drugs and chemicals for purity	73
Milk	271
Limestone, Corozal farm	1
Liquid substance (poison) for division of police	2
Dairy feed	12
Flour	2
Articles of clothing	1
Commercial product "Pypo"	1
Quinine hydrochloride	1
Ether for anesthesia	1
Dried beet pulp	2
Condensed milk	2
"Jarabe de Ipecac"	1
Aspirin tablets	2
Methyl alcohol	1
Soap	2
Manufacture of liquid "Tanglefoot"	1
Potassium bitartrate	1
"Sal soda"	1
Marine engine oil	9
Gasoline	6
Kerosene	8
Crude petroleum	1
Epsom salts	1
Miscellaneous:	
Agglutination reactions	14
Autopsies	298
Bodies embalmed	65
Pathological tissues prepared, frozen	290
Pathological tissues prepared, paraffin	3,172
Surgical pathological tissues and neoplasms reported	257
Vaccinations, antipest	3
Vaccination, smallpox	20
Vaccine inoculations, antityphoid	10
Vaccine treatment, autogenous, prepared	27
Wasserman reactions	2,705
Microscopic examination of stools	4
Preparations of salvarsanized serum for intraspinous treatment	11
Medical legal investigations	11
Vaccine points manufactured	16,952
Tuberculin test, cattle	78
Immunization of hogs with hog cholera serum	109
Cremations (February to June)	51
Autogenous blood serum preparations	2
Animals autopsied	11
Interments (February to June)	85

TABLE XXIV.—*Issues of quinine.*

Month.	Kilograms.	Pounds avoirdupois.
July	20.00	44.09
August	11.00	24.25
September	37.00	81.57
October	21.00	46.30
November	22.50	49.60
December	12.10	26.68
January	40.00	88.18
February	42.00	92.59
March	24.60	54.12
April	27.50	60.50
May	35.00	77.16
June	13.66	30.11
Total	306.36	675.15
Average per month	25.53	56.26

TABLE XXV.—*Sanitation.*

CITY OF PANAMA.

Mosquito, rat, and fly work:	
Miles of ditches cleaned	74.5
Miles of ditches dug	11.9
Square yards pools oiled	1,610,041
Water containers treated	480,024
Mosquito breeding places found	5,280
Fly breeding places found	5,485
Quarts of flies trapped	891
Rats trapped	6,746
Disinfection work: Rooms disinfected	56
Material used:	
Crude oil (gallons)	12,051
Larvacide (gallons)	7,946
Inspection of houses and yards:	
Houses and yards inspected	63,553
Notices served and nuisances abated	1,888
Number of old buildings condemned	639
Number of buildings demolished	194
Number of yards cleaned	47
New buildings:	
Number of plans for new buildings approved	286
Number of permits granted for repairs to old buildings	856
Garbage collection:	
Number of loads of garbage removed to dump and burned	52,932
Total number of cans of garbage emptied	1,290,674
Total number of garbage cans placed	1,537
Street cleaning:	
Number of square yards of streets cleaned daily	600,000
Number of square yards of streets sprinkled daily	90,000
Vaccinations: Number of persons vaccinated	15,769

COLON, CRISTOBAL, MOUNT HOPE, AND TORO POINT.

Water and sewers:	
Number of connections made during the year	34
Total number of connections made to date	1,181
Number of outstanding permits	425
Number of houses in which extensions were made	62
Houses:	
Plans approved	55
Permits to repair issued	789
Permits to occupy issued	28
Temporary permits to occupy issued	9
Number of bills collected for work for private parties	588
Sanitation of Colon:	
Number of loads of yard garbage removed	5,256
Average number of cans of garbage removed daily	2,258
Number of acres of vegetation removed	126
Number of acres of streets cleaned	9,819
Number of private properties cleaned	618
Number of square yards of pools oiled	339,494
Number of mosquito breeding places destroyed	1,270
Number of water receptacles treated	303,169
Number of linear feet of ditches constructed	249
Number of miles of ditches maintained	18.4
Number of mosquitoes caught	3,254

Sanitation of Colon—Continued.	
Number of nuisances abated	1,855
Number of buildings inspected	40,674
Number of rats killed	2,903
Number of square yards of alleys cleaned	8,322,332
Number of square yards of streets sprinkled	1,550,000
Number of fly breeding places destroyed	963
Number of gallons of larvacide used	3,035
Number of gallons of crude oil used	3,394
Number of doses of quinine issued	41,059
Number of dogs killed	216
Number of cubic feet disinfected	517,824
Number of cubic feet fumigated	68,624
Square yards streets oiled	3,996
Gallons oil used for streets	2,100
Colon and Cristobal garbage disposed of at dump, Colon.	
Sanitation of Cristobal:	
Number of square yards of pools oiled	53,790
Number of water receptacles treated	40,839
Number of mosquito breeding places destroyed	239
Number of fly breeding places destroyed	82
Number of buildings inspected	3,365
Number of gallons of larvacide used	366
Number of gallons of crude oil used	764
Number of loads of yard garbage removed	996
Number of cans of garbage removed	108,815
Number of square yards of vegetation removed	893,865
Sanitation of Mount Hope:	
Number of square yards of pools oiled	1,181,920
Number of water receptacles treated	179,370
Number of miles of ditches maintained	58
Number of mosquito breeding places destroyed	1,047
Number of miles of ditches constructed	11.8
Number of mosquitoes killed in outfit cars	22,951
Number of mosquitoes killed in barracks	50,820
Number of gallons of crude oil used	24,492
Number of gallons of larvacide used	2,536
Number of rats killed	7
Number of cans of garbage removed	18,457
Number of square yards of vegetation removed	669,632
Number of fly breeding places destroyed	14
Mount Hope Cemetery maintained.	
Sanitation of Toro Point:	
Number of square yards of pools oiled	15,150
Number of water receptacles treated	2,660
Number of mosquito breeding places destroyed	11
Number of linear feet of ditches maintained	1,193
Number of cubic yards of old ditches reconstructed	649
Number of adult mosquitoes killed	1,411
Number of fly breeding places destroyed	1
Number of gallons of larvacide used	27
Number of gallons of crude oil used	284
Mindi Island:	
Number of square yards of filling in low places	4,404
Number of square yards of vegetation removed	20,900
Number of linear yards of ditches constructed	7,727
Number of linear yards of ditches maintained	830
Wooden culvert constructed	1
Vaccinations: Number of persons vaccinated	669

CANAL ZONE.

Work requests on supply department:	
Grass cutting	116
Screen repairing	136
Miscellaneous	883
Work requests on engineering department	102
Work requests on other departments	8
Notice served for abatement of nuisances	529
Arrests for violation of sanitary regulations	23
Convictions	22
Building permits approved	2
Inspections of closets	22,939
Inspections of stores	605
Inspections of restaurants	48
Inspections of shops	1,499
Garbage cans emptied	1,054,151
Closets disinfected	38,257
Houses disinfected	28
Rat traps used daily	1,870
Number of adult anopheles destroyed at houses	149,813
Number of adult culices destroyed at houses	118,638
Number of containers found with stegomyia larvæ	77
Number of adult stegomyia destroyed in houses	12

Material used:	
Larvacide (gallons)	11,228
Crude oil (gallons)	168,592
Kerosene used (gallons)	842
Rats destroyed	7,518

TABLE XXVI.—*Quarantine service.*

PORTS OF PANAMA-BALBOA AND COLON-CRISTOBAL.

Number of vessels inspected and passed		1,884
Number of vessels detained in quarantine		146
Number of vessels fumigated on arrival		108
Number of vessels fumigated prior to departure		26
Number of crew inspected		136,142
Number of passengers inspected		54,130
Total number of persons inspected		180,272
Number of persons vaccinated at ports of arrival because of compulsory vaccination law		7,330
Number of persons vaccinated at ports of departure or en route because of compulsory vaccination law		13,042
Total number of persons vaccinated		20,372
Number of persons held in quarantine at the detention stations to complete period of incubation of yellow fever or plague		3,927
Number of persons held in quarantine on board vessels to complete period of incubation of yellow fever or plague		17,350
Total number of persons held in quarantine		21,277
Number of persons landed from foreign ports:		
Cabin	23,243	
Steerage	13,974	
		37,217
Number of persons embarked for foreign ports:		
Cabin	25,132	
Steerage	22,023	
		47,155
Apparent decrease for the year from foreign ports:		
Cabin	1,889	
Steerage	8,049	
		9,938
Number of persons arriving from coast towns on small craft		26,232
Number of persons embarked for coast towns on small craft		21,760
Apparent increase for the year from coast towns		4,472
Total number of persons landed		63,449
Total number of persons embarked		68,915
Excess over number landed		5,466
Plus number for Pacific ports		2,676
Total apparent decrease for the year		8,142
Number of immigrants recommended for rejection		162
Number of certificates issued to outgoing passengers		61
Number of persons refused certificates because of trachoma		2
Number of bills of health viséed		1,823
Number of inspections of docks		24
Number of inspections of vessels at docks		47

BOCAS DEL TORO.

Number of vessels inspected and passed	252
Number of crew inspected and passed	15,311
Number of passengers inspected and passed	3,508
Number of passengers, in transit, inspected and passed	3,805
Number of persons held to complete period of incubation of yellow fever	13
Number of persons held to complete period of incubation of plague	13
Number of vessels fumigated	1

TABLE XXVII.—*Personnel report.*

[Average monthly number of employees at work during year.]

	1914–15	1913–14	June 30, 1915.		Total.
			Officers and employees.	Skilled and unskilled labor.	
Chief health office	5	24	4	....	4
Medical storehouse	8	9	4	5	9
Quarantine service	42	40	24	18	42
Health office, Panama	140	138	20	155	175
Health office, Colon	134	125	16	134	150
Ancon Hospital	345	520	218	110	328
Colon Hospital	34	84	22	16	38
Santo Tomas Hospital	5	6	6	....	6
Taboga Sanitarium	....	19	....	....	....
Palo Seco Leper Asylum	23	15	9	23	32
Zone sanitation	109	166	18	90	108
Hospital farm	49	34	3	47	50
Dispensaries:					
Ancon	....	5	....	....	....
Balboa	6	6	6	....	6
Bas Obispo	....	2	....	....	....
Corozal	4	5	4	....	4
Cristobal	1	6	....	....	....
Culebra	3	5	....	....	....
Empire	2	6	....	....	....
Frijoles	....	1	....	....	....
Gatun	4	7	5	....	5
Gorgona	....	4	....	....	....
Las Cascadas	....	3	....	....	....
Margarita Point	1	1	....	....	....
Miraflores	....	3	....	....	....
Naos Island	1	2	1	....	1
Paraiso	4	4	5	....	5
Pedro Miguel	3	4	3	....	3
Porto Bello	....	3	....	....	....
Toro Point	....	2	....	....	....
Gamboa	1	....	1	....	1
Total	924	1,249	369	598	967

TABLE XXVIII.—*Hospital and total cases of malaria among employees.*

	Admissions.				Died.				Total cases.		Annual average per thousand deaths.		Annual average per thousand cases.		Number of employees.
	White.		Colored.		White.		Colored								
	Hospital.	Total.	Hospital.	Total.	Hospital.	Total.	Hospital.	Total.	Hospital.	Total.	Hospital.	Total.	Hospital.	Total.	
July	80	135	259	269	....	....	....	....	339	404	......	......	87	104	46,616
August	57	111	192	219	....	....	....	....	249	330	......	......	68	90	44,132
September	44	80	172	182	....	....	....	1	216	262	......	0.30	64	77	40,623
October	59	88	152	156	1	1	1	1	211	244	0.62	.62	66	76	38,416
November	48	80	133	134	....	....	....	....	181	214	......	......	58	69	37,172
December	48	79	100	105	....	....	....	1	148	184	......	.33	49	61	36,224
January	33	53	104	115	1	1	1	1	137	168	.67	.67	46	57	35,618
February	38	53	83	84	....	....	....	....	121	137	......	......	42	48	34,266
March	35	53	80	81	....	....	1	1	115	134	.35	.35	40	47	34,218
April	15	21	59	60	....	....	....	....	74	81	......	......	26	28	34,125
May	37	43	54	54	....	....	....	....	91	97	......	......	32	34	34,600
June	69	79	178	178	....	....	1	1	247	257	.33	.33	81	82	36,564
Total	563	875	1,566	1,637	2	2	4	6	2,129	2,512	.16	.21	56	67	37,715

APPENDIX J.

REPORT OF THE EXECUTIVE SECRETARY, EXECUTIVE DEPARTMENT.

Balboa Heights, Canal Zone, *July 26, 1915.*

Sir: I submit herewith a report covering the work of the executive department during the fiscal year 1915. This includes a statement of the business transacted by the courts of the Canal Zone, which for administrative purposes only are affiliated with the executive department.

ORGANIZATION.

The organization of the department was fully described in my last annual report. There have been no subsequent changes, except that in July, 1914, the division of posts and the Canal Record office were merged with the division of civil affairs.

EXECUTIVE OFFICE.

During the period between July 1, 1914, and September 1, 1914, the work of the executive office was carried on with the same force and under practically the same conditions that existed on the date the new organization went into effect, i. e., April 1, 1914. Between August 20, 1914, and September 14, 1914, the general administrative offices of the canal were transferred from Culebra, Empire, and Ancon to the new administration building at Balboa Heights, and on October 15, 1914, the general offices of the Panama Railroad Company were likewise located in the new building. Incident to this change, the scope of the executive office broadened very materially, and, following the original plan as outlined in the report of the executive secretary for the fiscal year ended June 30, 1914, practically all of the clerical work (with the exception of the accounting department) previously handled separately by the different departments and divisions was assigned to the executive office force. It became necessary, therefore, to substantially increase the force of the executive office in order to handle the work properly. This consolidation of the clerical forces under the executive office was accomplished by the transfer of employees from other departments and divisions, and resulted in a reduction in the total force.

The following bureaus were established on a permanent basis, under the direction of the executive secretary, assisted by the chief clerk:

CORRESPONDENCE BUREAU.

This bureau furnishes stenographic and typewriting service for all the offices in the administration building, prepares monthly and annual reports, estimates, and statistical data, and does such other clerical work as it may be called upon to perform. Force employed on June 30, 1915, 39 gold and 4 silver.

PERSONNEL BUREAU.

This bureau handles all matters pertaining to the personnel of The Panama Canal and the Panama Railroad Company. Force employed on June 30, 1915, 12 gold.

RECORD BUREAU.

This bureau has charge of the records of The Panama Canal and the Panama Railroad, the indexing and filing of papers, receiving and mailing all correspondence and transmittal of all papers between offices, the consolidation of records, the indexing and filing of maps and drawings, the Panama Canal library, the publication of circulars, and supervision of the executive office printing plant. Force employed on June 30, 1915, 25 gold and 15 silver.

TIMEKEEPING BUREAU.

This bureau is charged with keeping the time of all employees of The Panama Canal and the Panama Railroad Company, the issuance of coupon books, and the preparation of force reports. Force employed on June 30, 1915, 54 gold and 13 silver.

PROPERTY AND REQUISITION BUREAU.

This bureau is charged with keeping the property records of The Panama Canal and the Panama Railroad (excepting the division of terminal construction and the mechanical division), and the preparation of work requests and local requisitions for material. Force employed on June 30, 1915, 16 gold and 4 silver.

BUREAU OF CLUBS AND PLAYGROUNDS.

During the year two clubhouses were closed and two opened, the buildings having been transferred from towns previously closed and abandoned. The Empire Clubhouse was closed July 14 and reopened with some structural changes at Balboa on Christmas eve with a community Christmas program attended by over 1,000 people. The Culebra rooms were closed September 15. On November 2 the Porto Bello Building was reopened at La Boca with appropriate exercises as a clubhouse for silver employees.

The type of activities has been adjusted so as to place greater emphasis upon the community life while at the same time giving attention to the needs of the bachelor employees. This change has been in conformity with the general change in the community life from that of the bachelor employee type to that of the employee with a family. Clubhouse membership as such, while still maintained, has been made secondary to the use of privileges at fixed charges in order that this larger community use might be made of the clubhouses and equipment irrespective of clubhouse membership.

An arrangement was made with the division of schools by which the clubhouse physical directors were given access to every schoolroom twice weekly for a short lesson in calisthenics. Attention has been given to exercises tending to correct posture, to enlarge breathing capacity, and to the play element in body-building exercises. Regular instruction has also been given in swimming and life saving to all children permitted by their parents to go in the water at each of the towns excepting Balboa, where a suitable swimming place is not yet available. In each gymnasium, in addition to the regular classes provided for men and older boys, classes have been conducted for the smaller boys and for women and girls with most satisfactory results. Monthly outings have been conducted for groups of children to local points of interest.

In four of the clubhouses Sunday evening song services have been regular features of the weekly program. These services have afforded opportunity for an expression of the religious life of the people and a means of providing an activity of popular interest for Sunday nights. The programs have been quite varied including musical evenings with song, moving-picture features, the celebration of special days, such as mothers' day, and occasional addresses by visiting and local speakers. Bible-study classes were held in two of the clubhouses and two other clubhouses in towns without a chapel were used by employee members of the Union Church for holding church services. The educational activities consisted of classes in Spanish, various educational lectures, and a traveling exhibit of charts prepared by the Scientific Temperance Federation of Boston to show the evil effects of alcohol upon human organism.

Social service has found expression in the development of the community Christmas program celebrating the opening of the town and the clubhouse at Balboa and later by the same community in preparation for an all-Isthmian celebration of July 4; in the development of the La Boca playgrounds project; and in the entertainment provided by residents of Pedro Miguel for passengers of slide-bound ships tied up at the locks. This entertainment has consisted of dances complimentary to the ships' passengers and crews, moving pictures, and the extension of other clubhouse privileges. At Gatun service has been rendered in placing magazines and newspapers on board United States transports conveying troops through the canal.

Reservations of plots of land have been approved during the year for the following activities: Farfan Beach for bathing and outing purposes; La Boca playgrounds for the use of silver employees under the management of the La Boca clubhouse; Balboa Heights and Ancon for two tennis courts for the use of clubs affiliated with the Balboa clubhouse and two ball grounds for the use of ball players in these same communities. The Balboa playground area was filled at the close of the dry season preparatory to grading for general playground use at the beginning of the next dry season. The Balboa Yacht Club was organized as a club of the Balboa clubhouse and secured a building to be erected later on a water site to be approved. The Balboa Gun Club was also organized. The baseball season closed with Cristobal the winner of the Governor's pennant, the emblem of championship. Baseball grandstands were erected at Cristobal, Pedro Miguel, and Balboa. A billiard room for men and a rest room for women employees were opened for use in the new administration building. The billiard and bowling equipment in the clubhouses was given larger usefulness during the year by making the game privilege available on Sundays. On Labor Day and on Washington's Birthday athletic and aquatic meets were held and on all holidays open house was observed at each of the clubhouses.

The program of imported entertainments included the Northwestern University Quartet, the Harry Corson Clarke Co., the Gordon Gunniss Co., Dr. Lincoln Wirt, lecturer; Tom Corwine, polyphonic imitator, and the Pennsylvania State College quartet. Among the local entertainment numbers were the Isthmian Concert Co., the annual high-school play, talking moving pictures, various local entertainments, and a weekly run of 84,000 feet of moving-picture films in the halls of the six clubhouses.

The financial management of the clubhouses is vested in the superintendent. All accounts are kept by the office of the auditor and all funds paid out by the collector upon voucher approved by the auditor. During the year there were eight clubhouses in operation with six at the end of the year. Revenue derived from memberships and the sale of commodities is carried by the collector as clubhouse funds and as such is expended in the operation of privileges and in the installation of improvements. The sum of $5,604.08 was expended in permanent improvements on tennis courts, playgrounds, and ball grounds.

The following is a statement of net receipts and expenditures resulting from clubhouse operations and includes the investments in playgrounds and improvements:

Balance on hand July 1, 1914		$26,886.88
Net receipts:		
Membership	$13,221.69	
Soda fountain	4,957.84	
Billiards and pocket billiards	686.73	
Barber shop	322.40	
Salable merchandise	846.92	
Motion pictures	335.96	
Hall rent	15.00	
Cigars and candy	1,991.35	
Locker rental and dormitory	75.00	
		22,452.89
		49,339.77
Net expenditures:		
Bowling alleys	1,055.04	
Entertainment (States)	2,722.80	
Entertainment (local)	3,379.82	
Library books, periodicals, etc	2,167.31	
Educational activities	104.83	
Physical activities	332.99	
Religious activities	298.70	
Playgrounds	3,240.79	
Pressing club	336.98	
Tennis club	717.28	
Tournaments	152.00	
Office help	5,706.02	
Maintenance and general expense	4,139.28	
Gymnasium supplies and equipment	528.07	
General equipment, supplies and expense	1,990.85	
Gun club	1.10	
Baseball grounds	1,126.41	
		28,000.27
Balance on hand June 30, 1915		21,339.50
Estimated liabilities June 30, 1915		5,278.38

The total expenses paid by the Government for salaries of secretaries and janitors, upkeep of buildings, printing, etc., is $42,568.16, as compared with $47,869.18 last year.

GENERAL BUREAU.

Included in this bureau are the surveying officer and his assistant, the official photographer and his assistant, 1 inspector, 1 inspector of motor cars, 3 motor men (operators of motor cars), 4 trainmen, 2 cable clerks, 1 information clerk, and 13 messengers. Force employed on June 30, 1915, 14 gold and 17 silver.

DIVISION OF CIVIL AFFAIRS.

CHANGES OF ORGANIZATION.

Effective July 1, 1914, the division of posts was abolished as a separate administrative unit and the post offices were transferred to the division of civil affairs. The Canal Record was transferred to the division of civil affairs July 22, 1914.

CUSTOMS BUREAU.

From 1904 to 1914 the Canal Zone customs service was conducted under authority of section 36 of act No. 8 of the so-called Laws of the Canal Zone, reading:

> There is hereby created and established a customs service for the Canal Zone, Isthmus of Panama. It shall be the duty of the customs service to administer the affairs of the customs district of Ancon and Cristobal pursuant to the customs laws, rules, and regulations of the United States, not inapplicable to the Canal Zone, and the enactment, rules and regulations of the government of the Canal Zone now in force or hereafter adopted.

As the application of the United States customs laws to cases arising in the Canal Zone was vague and uncertain, the preparation of specific local customs regulations was undertaken. The object proposed was to provide simple rules for the entering and clearing of vessels and for the release of cargo with due regard to the interests of the Republic of Panama, but without impairing the complete administrative jurisdiction of the Government of the Canal Zone over the terminal ports. It was also desired to coordinate the work of the customs bureau with that of the marine department, the quarantine service, the division of police, and the Panama Railroad, insure the intelligent cooperation of all officers and employees having to do with vessels or cargoes, and avoid unnecessary duplication of work and records. The first regulations were embodied in the Governor's Circular No. 679, dated July 14, 1914, and the President's Executive order of August 8, 1914, published as Circular No. 601–21. Certain minor changes in the direction of greater simplicity were found advisable and these were embodied in a revision of Circular No. 679 issued November 21, 1914. The regulations have proved satisfactory; they meet all present requirements and can be readily amplified when occasion requires.

The President, in his Executive order of January 27, 1914, provided that the executive secretary should, "in person or through one of his assistants, perform the duties of a shipping commissioner." In conformity with this order the chief of the division of civil affairs was designated shipping commissioner for the Canal Zone. The intention was to confer on the chief of the division of civil affairs the authority with reference to seamen formerly vested in the collector of customs. The latter had assumed and exercised practically the same powers as are conferred by law on American consuls in foreign ports for the shipment and discharge of seamen, their relief in certain cases, and the arbitration of disputes between seamen and the masters of vessels. However, the Comptroller of the Treasury ruled under date of July 21, 1914, in the case of Peter Linafors, that the only American seamen in the Canal Zone who may be given relief and protection are shipwrecked seamen; and the authority of the shipping commissioner to ship and discharge seamen has recently been questioned by the Department of Commerce. As the terminal ports of the Canal Zone are without the jurisdiction of the American consuls at Panama and Colon, and seamen's cases are constantly arising which require action, it is important that the authority of the shipping commissioner should be clearly defined and amplified. Section 84 of the act of July 1, 1902, to provide for the Government of the Philippine Islands, prescribes that the laws relating to seamen on foreign voyages shall apply to seamen on vessels going from the United States to the Philippine Islands, "the customs officers there being for this purpose substituted for consular officers in foreign ports." The enactment of similar legislation for the Canal Zone is recommended.

The customs bureau is charged with the administration of the President's Executive order of January 9, 1908, which extends to the Canal Zone certain Chinese-exclusion laws of the Republic of Panama. Attempts to enforce this order in the case of Chinese seamen on vessels using the canal and its terminal ports have been a source of constant friction. Both the district attorney and the marine department have recommended the repeal of the order and the enactment of legislation which will subject the masters of vessels using the canal to less unnecessary delay and annoyance. As the Attorney General has ruled that the President is without authority to amend the Executive orders issued prior to the Panama Canal act, this will require congressional action.

Under an agreement with the United States Treasury Department, the bureau of customs is authorized to inspect and seal household goods and miscellaneous effects of American manufacture belonging to employees of The Panama Canal, the Panama Railroad Company, and the United States Government which are intended for shipment to the United States. These goods are then admitted into the United States free of duty and without further inspection. There have been 467 such inspections during the year, covering 2,828 pieces of freight. The bureau of customs also certifies invoices covering ordinary shipments from the Canal Zone to the United States, using forms identical with those prescribed for certification by American consuls in foreign ports. There were 945 invoices thus certified during the year.

Since the canal was opened to traffic there has been a gradual increase of shipping at Balboa and Cristobal. The total number of vessels entered was 2,135 and the total number of vessels cleared was 2,125. In the preceding fiscal year only 575 vessels entered and 573 cleared. There were 1,033 seamen shipped on American vessels and 941 seamen discharged, as compared with 824 seamen shipped and 635 seamen discharged during the preceding year.

LICENSES AND TAXES.

By the provision of the Executive order of the President, dated October 13, 1914, the license and tax laws of the Canal Zone were revised so that many of the fees and rates were reduced, and some taxes were abolished which had been in existence prior to the American occupation of the Zone. The general intent of the order was to do away with such taxes as are not ordinarily imposed in the United States, and to have licenses expire at the end of a quarter, or some other stated period, rather than allow them to run for a year from the date of issue, as had previously been done with motor-vehicle licenses.

A complete statement of the licenses issued and taxes collected during the fiscal year will be found included in the report of Canal Zone revenues, printed in a table accompanying the auditor's report.

ADMINISTRATION OF ESTATES.

During the year 268 estates of deceased and insane employees of The Panama Canal and Panama Railroad Company were administered, and there were 14 estates in the course of settlement on June 30, 1915.

Of the 268 estates settled during the year 174 estates were delivered to the consular or diplomatic representatives in the Republic of Panama or the United States of the countries of which the deceased or insane person was a citizen or subject; 86 estates were settled direct with the heirs upon satisfactory evidence of heirship being furnished; 4 estates were settled with administrators; 2 estates were repaid to persons who had recovered their sanity; the net proceeds of one estate were used to settle a claim and one estate was escheated to the Government of the Canal Zone. The escheated estate amounted to $28.49.

The amount involved in the settlement of the 268 estates was $15,524.01, of which $14,350.67 belonged to the estates of deceased employees and $1,173.34 to the estates of insane persons.

On June 30, 1915, there were 14 estates remaining unsettled, and 5 additional cases were being investigated in which no money or property had yet been received.

POSTAL SERVICE.

The receipts of the post offices for 1915 were approximately $15,000 less than in the previous year, and the expenses were about $24,000 less. The deficit was $55,327.23, as compared with $64,521.19 in 1914. In any consideration of the postal deficit it should be remembered that the postal service is still burdened with a subsidy to Panama equivalent to 40 per cent of its stamp sales—in 1915 $28,385.60—and that the service is allowed no credit in the accounts for the interest earned by money-order and postal-savings funds on deposit with banks, amounting in 1915, according to an estimate furnished by the auditor, to $43,918.52. If the subsidy were withdrawn and if credit were allowed for interest earned by these funds, the account would not show a deficit.

There were 13 post offices in operation at the beginning and at the close of the fiscal year. One new office—Balboa Heights—was opened July 15, 1914, and one office—Frijoles—was closed September 30, 1914.

The total revenue from postal sales, including box rents, was $78,807.03, as compared with $91,064.30 for the preceding year. The sale of postage stamps and postal cards, including the revenue from the sale of stamp books, amounted to $74,843.88, as compared with $90,590.63 for the year ended June 30, 1914, and $988.50 was collected for second-class mail matter, as compared with $463.67 for the preceding year.

During the year there were manufactured in the office of the director of posts and in the post office at Balboa Heights 32,550 stamp books containing twelve and twenty-four 2-cent stamps and twenty-four 1-cent stamps. The cost of manufacturing these books is less than one-third of a cent, and they are sold for 1 cent more than the face value of the stamps contained in each. The total number of stamp books sold during the year amounted to 36,299, as compared with 43,996 for the previous year, producing a net revenue of $242, as compared with $293.31 for the preceding year.

A charge of 50 cents per quarter for call boxes and $1 per quarter for key and combination lock boxes, payable in advance, was made effective January 1, 1915. The box rent collected from January 1 to June 30, 1915, amounted to $2,974.65.

There were 170,558 money orders issued during the year, amounting to $3,948,762.86, on which the fees amounted to $13,169.55. The average amount of each order issued was $22.11. Compared with the preceding fiscal year, there was a decrease of 28,270 in the number of orders issued, a decrease of $80,601.97 in the amount, and a decrease of $6,238.56 in fees collected.

The postal savings system established in the Canal Zone by the President's Executive order of September 8, 1911, was modeled on the system in operation in the United States, with the exception that no provision was made for the payment of interest. The system required a complicated set of accounts in each post office and in the office of the Auditor, and was not suited to the needs of the Canal Zone. In July, 1914, the board of trustees for the control, supervision, and administration of the postal savings system of the Canal Zone reported to the Governor that every purpose of the existing system would be served equally well by the issue, without fee, of money orders payable only to the purchaser at the office of issue, these money orders to take the place of the postal savings certificates then used. The change was authorized by the President in an Executive order dated September 5, 1914. It has greatly simplified and reduced the clerical work in all post offices without in any way affecting the interests of the depositors.

Postal savings deposits on June 30, 1914, amounted to $498,481. From that date to the time of reorganization, October 1, 1914, additional postal savings certificates were issued to an aggregate value of $804,751. The certificates paid during the fiscal year totaled $1,178,571, leaving on June 30, 1915, only 348 of the original postal savings accounts, represented by unpaid certificates for $124,661. The new deposit money orders issued from October 1, 1914, to June 30, 1915, had a total value of $1,075,570, and payments of deposit money orders during the same period aggregated $722,680, leaving a balance on deposit at the close of the year of $352,890. There were also on deposit on June 30, 1915, $33,781.70 in the form of ordinary money orders issued by and drawn on Canal Zone post offices in favor of the remitter. The total deposited with the post offices for safekeeping on June 30, 1915, was therefore $511,332.70.

In the registry division of the post offices 126,134 parcels and letters were handled. Of this number 19,213 were domestic letters, 3,502 domestic parcels, 29,500 foreign letters, 1,701 foreign parcels, 70,130 official letters and parcels registered free, and 2,088 letters and parcels reregistered free. Compared with the preceding fiscal year there was a decrease of 14,955 registered letters and parcels handled. Ancon and Cristobal, as exchange offices, handled 74,624 registers; of these 2,803 passed through the Ancon post office to and from Panama and South America, and 71,821 through the Cristobal post office to and from the United States and foreign countries. Approximately 60 per cent of the registered matter handled by the division of posts was official matter of The Panama Canal from which no revenue was received; and the same ratio will probably hold true with regard to ordinary mail. There were delivered during the year at all post offices 96,683 registers and insured and C. O. D. parcel-post packages. Customs duty was paid to the Government of Panama to the amount of $6,475.21 on 5,506 mail parcels for nonemployees and on prohibited articles imported by employees, as compared with $8,751.33 for the preceding fiscal year.

The Cristobal exchange office made 1,114 dispatches of mail by ocean carriers, of which 198 were for the United States and 916 for foreign administrations.

In addition to the direction and supervision of post offices and general correspondence pertaining thereto, the office of the director of posts issued 1,328 duplicates of lost or stolen money orders; investigated 161 cases of the loss, rifling, or nondelivery of registered mail; undertook special investigations for United States Post Office Department regarding mail in transit across the Isthmus; made 41 inspections of post offices, and issued 74 circulars of instruction to all postmasters. Unclaimed ordinary mail matter addressed for delivery in the Canal Zone was returned to the countries of origin; unclaimed registered mail and parcel post matter was disposed of by sale, or by destruction if worthless; insufficiently addressed letters were advertised and delivered, or opened and returned to senders.

Section 42 of act No. 8 of the so-called laws of the Canal Zone, promulgated, enacted September 2, 1904, contained the following:

> The postal service of the Canal Zone shall be conducted and controlled by such of the laws, rules, and regulations of the postal service of the United States as are not inapplicable to the conditions of law and fact existing in the Canal Zone and the laws enacted and the rules and regulations adopted by the Isthmian Canal Commission.

The district attorney advised in July, 1914, that he did not consider this provision sufficiently broad to define as criminal any acts in violation of the postal regulations of the United States. Steps were then taken to obtain an Executive order extending to the Canal Zone the penal clauses of the United States Postal Laws and Regulations. The order in question was signed by the President August 14, 1914. There has been one prosecution and one conviction under the order.

Effective January 1, 1915, the Panama Railroad Steamship Line reduced its charges for the transportation of Canal Zone mails between Cristobal and New York from 40 cents to 35 cents a pound in the case of letters, and from 8 cents to 4½ cents a pound in the case of printed matter. This has resulted in a saving of approximately $2,500 per annum.

In May, 1911, a plan had been adopted for the dispatch of mail to the United States designed to favor the Panama Railroad Steamship Line, without particular reference to transit time. This plan was followed until August, 1914, when authority was obtained to forward the mails in the manner calculated to insure the quickest delivery in the United States. The new schedule was based on information furnished by the United States Post Office Department.

Arrangements were also made during the year for the transfer to a launch at quarantine of mails arriving at Cristobal in the early morning, making it possible to forward these mails from Cristobal at 7.15 a. m. instead of 11.05 a. m. Thus letters received from the United States on Thursday morning can be answered in time to catch the outgoing steamer the same afternoon.

Until April, 1915, parcels post mails for the west coast of Central and South America were forwarded by way of New York and New Orleans exchange post offices. As these mails were returned by the exchange offices over the same routes by which they were forwarded the arrangement caused unnecessary cost of sea transportation and a considerable delay. In April, 1915, arrangements were made with the British Packet Agent and the Postal Agents of San Salvador, Nicaragua, and Honduras for forwarding these mails direct from Balboa through the Ancon Exchange post office.

In June, 1915, the limit of weight (4 pounds 6 ounces) on first class mail matter was removed and the limit of weight of mail matter of the third and fourth class was raised from 11 pounds to 20 pounds to conform with the parcels post weights in effect in the United States.

A number of minor changes were made in the post office methods that simplified the work and increased the efficency.

CANAL RECORD.

In October, 1914, the Governor approved a recommendation that the Canal Record be continued after January 1, 1915, as a weekly paper with a normal issue of four pages for the publication of shipping news, statistics of traffic, Executive orders, official advertisements, notices and circulars. Confining the scope of the paper within these limits permitted a reduction of the force employed for its compilation to one man. At the same time the free distribution of the Record was restricted to employees of The Panama Canal and the Panama Railroad Company on the gold roll, government departments and officials, the diplomatic and consular representatives of foreign nations, public libraries, newspapers and correspondents. For all others subscription rates of $1 per annum (domestic) and $1.50 per annum (foreign) were fixed. This reduced expenses by eliminating from the mailing list all those who had no real need for or interest in the paper, and resulted in some revenue which is expected to increase with canal traffic.

It has been found impossible to reduce the size of the Canal Record to less than eight pages, as the amount of official matter to be published is greater than had been anticipated, but in other respects the plans outlined above have been carried out. The cost of publication for the fiscal year 1914 was $23,227.83; and for the fiscal year 1915 $13,585.15. For the first six months of the latter year the cost was $8,054.88, and for the last six months, after the new policy went into effect, $5,530.27. Collections on account of subscriptions, the sale of extra copies and bound volumes have amounted to $498.97.

POLICE AND FIRE DIVISION.

On August 26, 1914, the office of the chief, police and fire division. was transferred from the administration building at Ancon to the new building at Balboa Heights.

The old rules and regulations of the divisions of police and prisons, and the division of fire protection were revised during the year and consolidated into one set of regulations, to agree with the consolidation of the two divisions. The new regulations were approved by the executive secretary and by the Acting Governor, effective January 15, 1915, and were subsequently printed and distributed.

A general reorganization of the entire division, approved by the Governor, was effected on October 1, 1914, which resulted in a total reduction in force of 28 persons, 26 in the police force, 2 in the fire force, and also a reclassification of titles and a rerating of salaries for members of both police and fire forces.

On September 1, 1914, the two police districts of Balboa and Cristobal were established, coincident with the judicial subdivision of the Canal Zone, and the Empire district abolished. The police stations in the Empire district were consolidated with the Balboa and Cristobal districts.

During the year 25 white and 12 colored police officers were appointed, and 38 white and 26 colored police officers left the service. Seventeen members of the fire force were appointed, and 18 left the service.

The Ancon police station was used as a central station until November 30, 1914, when the new police station at Balboa was occupied, the building formerly used as a police station at Empire having been removed and reerected at Balboa, including an addition, the lower floor of which is occupied by the magistrate's court for Balboa subdivision. A call station maintained at Balboa dock prior to the occupation of Balboa station was abolished, and the Ancon station was designated a call station of Balboa. A building formerly used as a sanitary office at Paraiso was slightly remodeled for the use of the police, and a call station established there on April 10, 1915. On May 1, 1915, the Canal Zone police were withdrawn from Las Savannas station, and the territory was turned over to the authorities of the Republic of Panama, in accordance with new boundary convention between the United States and Republic of Panama. The Las Savannas police station building and stable were included in this transfer. Culebra substation was abolished on June 30, 1915, and police work in this territory, west of the canal, was assigned to Pedro Miguel substation. The substation at Naos Island was abolished on October 15, 1914, on account of the establishment of a military post at that point. The colored policeman formerly stationed at Colon Hospital was withdrawn on October 31, 1914. Plans were made for a new penitentiary, which is urgently needed, but the construction was delayed on account of lack of sufficient funds.

During the year 5,157 persons were arrested, of whom 4,869 were males and 288 females, an increase of 246 as compared with the previous year; 4,252 arrests were made without warrants and 905 were made with warrants; 5,313 charges were filed against the persons arrested. Of the 5,157 persons arrested, 4,107, or 82.04 per cent, of those tried were convicted, 892 dismissed, 98 turned over to military and naval authorities, 11 sent to insane asylum, 2 to the quarantine authorities, 11 to the authorities of the Republic of Panama, 4 extradited to the United States, 4 returned to merchant vessels, 3 to British consul to be delivered aboard ship, 1 released on own recognizance and failed to appear for trial, 15 forfeited bail and failed to appear for trial, 2 died while in custody, and at the close of the year 7 were awaiting trial.

There were 8 homicides in the Canal Zone during the year. Seven cases were brought to trial, and resulted in 3 convictions and 4 acquittals or dismissals. In the eighth case evidence was procured against a resident of Panama whose extradition was refused. There were 6 suicides during the year.

Eight arrests were made at Balboa and one at Cristobal during the year for violations of the quarantine regulations, and convictions were secured in all nine cases. Two additional cases were also investigated at Balboa, but no arrests were made.

Two arrests were made at Balboa and two at Cristobal for violations of the navigation regulations, and convictions were secured in all four cases. One additional case was investigated at Balboa, but no arrest was made.

The police records of 1,103 persons, who had been previously arrested, were prepared, sworn to, and submitted to the courts for their information a decrease of 27 as compared with the previous year.

There was a monthly average of 114 prisoners serving sentences in the common jails of the Canal Zone during the year. They were employed continuously on public improvements, such as roads, streets, etc., and janitor service in public buildings. The total value of the labor performed by the prisoners, on a basis of 10 cents per hour, amounted to $17,104.10. Of this amount $9,672.60 represents labor performed on roads, streets, public grounds, etc., $7,316.30 janitor service in public buildings, and $115.20 value of labor performed in repairing uniforms for prisoners confined in the common jails. Several common jail prisoners attempted to escape while working on roads, but were recaptured in a short time.

During the year 206 animals were impounded and $446 collected for pound fees and maintenance charges.

Continuous guard duty was performed by the police officers at each set of locks at Gatun, Pedro Miguel, and Miraflores. On April 15, 1915, the guard was increased at Pedro Miguel to six and at Miraflores to seven officers on account of the withdrawal of the United States troops from these locks.

A police launch was maintained at Gamboa during the year to patrol the Chagres River and the canal at Gaillard Cut. It also became necessary to patrol the Gatun Lake area again on account of the number of instances of natives returning to and squatting on the areas which had been previously depopulated. A new launch was purchased for this work at a cost of $4,241.45 and placed in service March 5, 1915. At Balboa the harbor was patrolled for a short time during the beginning of the year with the old launch *Barbacoas*, which had been transferred from Gatun. This launch proved to be unserviceable, however, and was condemned in September, 1914. Since the pooling of the launches under the canal transportation department on July 1, 1914, and the subsequent discontinuance of the police harbor patrols by launches exclusively used by the police division experience has shown that police service at the harbors has been unsatisfactory. A recommendation was made and approved for the purchase of another launch, like the one placed in service on Gatun Lake, for exclusive use in patrolling Balboa Harbor. This launch is expected to arrive in a short time. A similar launch is necessary to patrol Cristobal Harbor.

Three motorcycles were received on the Isthmus October 27, 1914. One machine was assigned to each of the terminal central police stations at Balboa and Cristobal for special service in the enforcement of automobile and other vehicular speed and operation regulations and for special service in emergency police conditions, and the other machine was assigned for use of the police and fire inspectors.

The work of depopulating the Canal Zone was continued during the year, and in connection therewith 1,136 privately owned houses were destroyed by the police or removed by the owners on request. Since the beginning of this work a total of 3,988 houses have been destroyed or removed. Proper authority was received in all cases of this kind, and reports in detail were submitted.

The work performed by the plain-clothes officers during the year shows that 508 arrests were made on misdemeanor and felony charges, of which 365, or 71.85 per cent, were convicted. Investigations were also conducted of 299 cases which did not require arrest, and many cases in which the defendants could not be found.

The detail of colored police officers to guard property in the yards and on the docks of the Panama Railroad at Balboa and Cristobal was continued during the year at the expense of the Panama Railroad. Several changes were made in the number of colored officers employed for this work in accordance with the requirements at different times. Three first-class policemen were detailed to guard the Cristobal commissary storehouse for the Panama Railroad until February 17, 1915, when they were withdrawn on account of the removal of the commissary storehouse to a new location and stationed at the entrance to the new docks at Cristobal. At the close of the year 30 colored officers were assigned to duty in the yards and on the docks of the Panama Railroad. A recommendation was made and approved that white American officers be substituted for the colored policemen on this work, effective July 1, 1915.

Sixty-six convicts were received at the penitentiary, a decrease of 30 as compared with the previous year. The aggregate sentences imposed on convicts who were received, amounted to 74 years and 7 months. Eighty-three convicts completed terms of imprisonment and were discharged from prison. They earned in "good time" credits 8 years, 4 months, and 26 days. The labor of the convicts was employed continuously on the construction of the road leading from opposite Empire to Gamboa, on the east side of the canal.

A sufficient number of convicts were employed to keep up the stockade buildings and grounds, and to do the kitchen work. The value of the labor performed by the convicts assigned to outside work, on a basis of 10 cents per hour, amounted to $12,431.50, and the value of labor performed inside the prison, other than maintenance work, amounted to $66.10. The cost of subsisting and guarding amounted to $21,956.64; included in this amount is the sum of $6,202.84, representing the increased cost of guarding by reason of the work on public improvements. Nine convicts were pardoned, and one prisoner under sentence to the penitentiary was pardoned before being transferred to the penitentiary on account of poor physical condition, and deported. No convicts escaped during the fiscal year.

One hundred and thirty-four persons were deported from the Canal Zone by the police during the year; a decrease of 18 as compared with the previous year. Of that number 73 were convicts who had completed terms in the penitentiary, and 61 were persons who had been convicted on misdemeanor charges and whose presence on the Canal Zone was deemed undesirable.

Coroner's investigations were held in 103 cases of death during the year. Of these 36 were due to accidental drowning and 35 to accidental traumatism. Investigations were made during the year in 294 cases of accidents involving personal injury. Of these, 188 were employees of The Panama Canal, 60 of the Panama Railroad, 44 none employees, and 2 unknown. In all cases of injuries detailed reports of the circumstances were made.

Property and personal effects of 58 deceased persons were collected and accounted for by the police during the year. Of that number 38 involved action by the coroner and his deputies, and 19 were cases of persons who died while under medical treatment on the Canal Zone. The cash and papers of cash value in connection with these estates amounted to $5,119.44. This does not include jewelry, real property, etc.

The supervision of the Empire slaughterhouse was continued until November 21, 1914. One hundred and ten animals were slaughtered during the period July 1 to November 21, 1914, and the revenues derived therefrom amounted to $381.50.

The new concrete fire station at Balboa townsite was occupied on January 11, 1915. This building is 57 by 37½ feet, with front exits for three pieces of motor apparatus, and accommodations for the station force on the second floor. The two-story frame fire station at Empire was turned over to the United States Army on January 9, 1915, together with the horse-drawn hose wagon, horses and other equipment in the district desired by the Army. The two-story frame fire station at Culebra was turned over to the United States Army on April 16, 1915. The horse-drawn hose wagon (without horses) and other equipment was transferred at the same time.

A new motor driven hose wagon was purchased during the year and installed at Balboa fire station to supplement the automobile fire engine. The chassis of the new hose wagon is of the same design as that of the two automobile engines previously purchased, so that repair parts may be used interchangeably on all three machines now in use. All fire apparatus and equipment was maintained in first-class condition. Repair parts for important apparatus were kept on hand for emergency use, and practically all repair work was done by members of the fire force. All fire house, fire extinguishers, hose reels, hose carts, nozzles, and other equipment distributed at United States Government property on the Canal Zone, and in buildings on docks, etc., of the United States and the Panama Railroad in the Republic of Panama were regularly inspected and maintained by the fire force. During the fiscal year 5,225 feet of 2½ inch rubber-lined fire hose was received and 8,103 feet of hose was surveyed and turned into the obsolete storehouse at Mount Hope. A considerable quantity of this hose was suitable for reissue to other departments and divisions. Two thousand feet of hose was transferred to the Fifth Infantry, United States Army, at Empire, and 2,000 feet of hose to the Twenty-ninth Infantry, United States Army, at Culebra. On June 30, 1915, 41,603 feet of rubber-lined hose remained in service. Fifty additional Pyrene extinguishers were purchased and installed during the year, to provide additional fire protection for electrical equipment at the electrical substations, relay stations, and switchboard stations. The Gamewell fire-alarm system at Empire and Culebra, with 8 alarm boxes, was turned over to the United States Army with the two fire stations and other equipment. The switchboard, dynamo, and other alarm equipment was removed from the Ancon fire station and installed in the new concrete station at Balboa, making it the terminal for Balboa, Ancon, and Corozal. All fire-alarm boxes were removed from Culebra and Empire, with the exception of the 8 turned over to the Army, and installed at Balboa, for protection of the many new buildings erected at this terminal. A new generator and switchboard was installed at Balboa central station to supply direct current for the extended fire-alarm system, and to permit of the charging of batteries for automobile fire engines, motor boats, and motor cycles of this division. On April 1, 1915, the wireman in charge of the fire-alarm system and his helper were transferred from this division to the electrical division.

The general fire-protection conditions on the Canal Zone were much improved during the year. This was brought about by the construction of concrete houses in place of the usual frame buildings, by greatly improved streets and roads, new pump stations, hydrants and mains, by cleaning up waste material and rubbish on the Isthmus generally, and by maintenance of a vigilant inspection service by the fire force.

On June 30, 1915, there were 8 volunteer companies in service, with a total membership numbering 121 men. These companies are composed of employees of The Panama Canal and the Panama Railroad. When their services are required they work under the direction of the officer or fireman in charge of a fire. Four volunteer companies were discontinued during the year; 1 at Empire, 1 at Culebra, and 2 at Balboa. No new companies were organized. All volunteers were drilled once a month.

One hundred and twenty-nine fires and 13 false alarms were reported during the year. Eighty-four fires occurred in property of The Panama Canal, 15 in Panama Railroad property, 3 in property of the United States Army, 7 in private property on the Canal Zone, and 15 in grass, rubbish, dumps, waste material, etc.; and 3 fires were attended in private property in Colon, and 2 in Panama City.

On the afternoon of April 30 a fire started in Colon near Eighth Street and Bottle Alley, which burned down about one-third of the city and greatly endangered the American town of Cristobal. An alarm of this fire was received at the Cristobal fire station at 3.10 p. m. When the firemen arrived the fire had spread to several two-story frame buildings on Bottle Alley, and it was evident that it could not be checked within the block. The Colon firemen were working at the fire at this time. Several attempts were made to stop the fire at different points, but unsuccessfully. The fire burned to Eleventh Street and damaged the new concrete building of the Panama Railroad, the commissary, the Masonic Temple building, and the telephone exchange building. The fire passed Eleventh Street and burned southward between Bolivar and D Streets to Fourteenth Street, when it was finally checked. At this location explosives were used to some extent to demolish some of the buildings. Every available means was employed to check this conflagration, in conjunction with the Colon and Panama Fire Departments. The automobile fire engine at Balboa station was shipped to Cristobal on a special train, accompanied by a number of firemen. Three Canal Zone firemen were slightly injured at this fire, and several others received burns about the face, hands, and shoulders. The damage to Panama Canal property from this fire was estimated at $12,000; and the damage to Panama Railroad property, $10,000. The property burned in the city of Colon was estimated at $1,110,000, all of which was privately owned, with the exception of $10,000 Panama Government property.

On March 8, 1915, a fire of unknown origin occurred in the mining dock at Fort Grant, which caused approximately $27,500 damage. The value of property involved was estimated at $55,000. This fire was extinguished by use of the turret fire nozzle on Clapet No. 7, and lines of hose from the fire pump on this clapet, the automobile fire engine, and the tug *Bolivar*, which reported to the fire. The dock is constructed of creosoted piling, and a large quantity of lumber was stored on it at the time of the fire, which added to its intensity.

On May 4, 1915, a fire occurred in the hold of the steamship *Pennsylvanian*, of the American-Hawaiian Line, shortly after the vessel had left the port of Balboa. She returned to Balboa on May 5 for assistance in putting out the fire. Clapet No. 7, equipped with fire pumps, was ordered to meet the vessel in the harbor and render assistance. She was berthed at the new concrete dock and lines of hose were immediately applied. Holes were cut through the deck and sides of the ship in order to reach the fire. Firemen entered the hatches with lines, but strong gases interfered with this work for a time. Laborers were employed by the vessel, but they quit work, after which soldiers were secured from Fort Grant, and they rendered very efficient service. The fire started in the engine room from the bursting of a fuel-oil feed pipe, and spread to the forward cargo compartments. The fire was extinguished at about 8 p. m. on May 7, after long hard work. A number of firemen, soldiers, and others were completely exhausted at different times. The damage resulting from this fire was estimated at $95,000, and the value of the vessel and cargo was estimated at $1,250,000.

On February 4, 1915, the Cristobal firemen worked at a big fire in Colon, and did effective work in preventing a conflagration. Four large frame buildings were burning when they arrived at the fire. The automobile and steam fire engines were operated to supply three lines. The fire was brought under control after one hour's work. The damage to private property in Colon caused by this fire was estimated at $35,000.

DIVISION OF SCHOOLS.

Fifteen buildings have been in use for school purposes during the year. In addition, two rooms in the old Washington Hotel at Colon Beach have been used for school purposes. The Empire and Culebra white school buildings were removed to La Boca during the summer vacation period and reerected as a 12-room school for the colored school children. During the year there were six teachers employed in this building. At Balboa four type 5 bachelor quarters were remodeled for use as a school for white children, the upper floor being used for the main high school and the lower floor for the grammar school. Two rooms in the administration building at Culebra were fitted up for use as a white school. The building formerly occupied as a colored school at Mount Hope was removed to Gatun in February and reerected for use of the colored pupils at Gatun.

The main high school was transferred from Ancon to Balboa and the branch high school from Gatun to Cristobal, where classes are conducted for the first and second year pupils. The seventh and eighth grades at Gatun were transferred to Cristobal November 9, 1914, on account of the small number of pupils attending these grades at Gatun. Because of the crowded condition of the pupils in the Cristobal white school, it was necessary to open a school on November 9, 1914, in the old Washington Hotel at Colon Beach for use of first, second, third, and fourth grades. The sixth grade of the Culebra white school was transferred to Pedro Miguel, effective November 19, 1914. The colored school at Mount Hope was discontinued December 31, 1914, on account of the small number of pupils attending. The closing of this school resulted in the reduction of one teacher. On account of the decrease in the number of pupils, the schools at Culebra and Las Cascadas were closed on February 12, 1915, all of the pupils from these schools being consolidated in the school opened at Empire on February 15. Three teachers were employed in the schools at Culebra and Las Cascadas, while only two were employed in the school at Empire, a saving of the salary of one teacher resulting from the consolidation.

Effective April 6, physical training in the white schools at Ancon, Balboa, Corozal, Pedro Miguel, Gatun, and Cristobal was placed in charge of the physical directors of the respective Y. M. C. A.'s and the principals and teachers instructed to cooperate with them in carrying out this important physical side of education.

Spanish was introduced in the four upper grades in the elementary white schools at Cristobal, Pedro Miguel, Ancon, Corozal, and Balboa at the beginning of the year and continued throughout. This work was covered by one teacher in all of these schools.

The usual medical inspection of pupils in the grammar grades of the white schools was made during the week beginning October 26. Inspections of all schools were made by the district physicians of the health department once each month in accordance with instructions of the chief health officer. Each teacher was supplied with a blank book in which is kept a permanent register of all pupils vaccinated.

No accidents occurred in connection with the transportation of school children, either by train or by brake, and the service has been satisfactory.

During the year fire gongs were installed in all of the larger schools. Each school is equipped with hand extinguishers, and teachers and janitors have been instructed by representatives of the division of fire protection in the use of these extinguishers. At least once a month a fire drill is held in every school.

During the year the preparation of a revised course of study has been carried on and has been practically completed. This new course of study will be printed during the summer vacation period and adopted at the beginning of the next school term. In revising the present course of study, committees of teachers were appointed to outline, under the general direction of the superintendent, the detailed work for their respective grades. The attempt has been to touch the essentials only, requiring the minimum uniformity for a school system with our local conditions and at the same time leaving the maximum freedom to the individuality and initiative of the teacher. The teacher has been kept in mind as a dynamic educational force rather than a pedagogical machine. The grade and child rather than the subject matter has been made the unit. The work of each grade has been divided into periods of six weeks.

The foundations were laid for a system of industrial training conducted as an integral part of the Canal Zone school system with cooperation of the mechanical division and the commissaries. A supervisor of industrial training competent to organize this extension of school work was appointed September 22, 1914. High school and eighth grade boys were given employment after school hours, on Saturdays and during vacations as salesmen and checkers in the commissaries; courses of instruction were conducted for apprentices in the shops, and classes in mechanical drawing and woodwork were organized in the high school. At Balboa, Ancon, Corozal and Pedro Miguel eighth grade pupils were given instruction in woodwork and sewing. Industrial training will be continued next year on broader lines and with more ample equipment.

THE COURTS.

In the district court 86 cases were pending at the beginning of the year, 779 cases were filed and 777 decided, leaving 88 cases pending on June 30, 1915. Of the cases decided 75 were civil, 341 probate, and 361 criminal. Court was held both at Ancon, for the Balboa division, and at Cristobal. Three-fourths of the cases heard arose in the Balboa division. There were 116 sessions of court. There were 577 marriage licenses issued by the clerk of the court and 216 deeds recorded. The sum of $5,277.16 was collected in fines, costs and fees.

In the magistrate's court for the Balboa subdivision 7 cases were pending at the beginning of the year, 2,889 cases were docketed and 2,892 were settled, leaving 4 cases pending at the close of the year. Of the cases settled 137 were civil and 2,755 were criminal. Of the criminal cases 30 were dismissed, 189 were committed to the district court, and there were 2,203 convictions and 333 acquittals. Collections on account of fines and fees amounted to $7,674.14.

In the magistrate's court for the Cristobal subdivision 3 cases were pending on July 1, 1914, 2,400 cases were docketed during the year, 2,398 cases were decided, leaving 5 pending at the close of business on June 30, 1915. Of the cases decided 164 were civil and 2,236 were criminal. The criminal cases resulted in 1,709 convictions, 337 acquittals, 69 dismissals, 9 cases compromised under sections 359 and 360 of the Code of Criminal Procedure and 112 cases committed to the district court. A total of $5,898.38 was collected in fees and fines.

MARSHAL.

The office of marshal for the district of the Canal Zone is created and his duties defined in section 8 of the Panama Canal act, approved August 24, 1912. He is assisted by the deputy marshal.

Nine hundred and sixty writs of process in civil and criminal cases were served during the year and a total of $8,269.37 was collected and disbursed by the marshal and his deputy.

SPECIAL ATTORNEY AND DISTRICT ATTORNEY.

The reports of the special attorney and of the district attorney are printed as appendices to the Governor's report.

RELATIONS WITH PANAMA.

Negotiations by correspondence or personal conference between the executive secretary and the secretary of foreign affairs of the Republic of Panama included, among others, the following subjects in addition to routine matters: The issuance of transportation on the Panama Railroad to employees and officials of the Panama Government and the abuse of the pass privilege; the granting of the commissary privilege to nonemployees with the sanction of the Republic of Panama; the decrease in infant mortality by preventing practice by incompetent midwives; filling in low land at national exposition grounds with material from Panama Bay; the matter of granting permission to American aviators to make flights over the city of Panama during the national exposition and the Panama Canal exhibit; examination by officials of the Republic of Panama of records of The Panama Canal from 1910, having reference to the reimbursement of the United States for the cost of waterworks, sewers, and pavements constructed within the cities of Panama and Colon, and the matter of reduction of water rents in the city of Colon; construction of a telegraph line for the Republic of Panama between Panama city and Empire and thence to the Canal Zone boundary in the direction of the town of Paja; transmission of messages over the Panama Canal telephone line to El Vigia; the contract and revocable license respecting the rental of two wires in the transisthmian duct line of the Panama Railroad between Panama and Colon; the strict enforcement of laws restricting immigration so as to prevent the landing of immigrants for whom there was little likelihood of employment and who were likely to become public charges; the delay in the promulgation, through the Republic of Panama Official Gazette, of sanitary ordinances prepared by the Panama Canal health officials; the health ordinances respecting the registration of births and deaths in the cities of Panama and Colon; the increase of import duties on goods entering the Republic of Panama and the proposed requirement that The Panama Canal secure a permit in each instance for the clearance of materials and goods through the Panama customs; the regulation of private hospitals in the cities of Panama and Colon and the reduction in rates at Colon hospital for Panama residents of Colon; unauthorized entry upon Canal Zone territory and exercise of police powers by Panaman police in pursuit of fugitives; the delivery of orders of sequestration or embargo decreed by Panaman courts against the wages of Panama Railroad employees, and the matter of maintaining a representative in the city of Colon by the Panama Railroad Company to receive such orders of garnishment; the segregation of stables in the city of Panama; the proposed sale of the American wharf in the city of Panama to the Republic of Panama, and the lease entered into between the Panama Railroad Company and Messrs. Pinel Bros. for the use of the wharf in the city of Panama known as the "English wharf"; the changes recommended to avoid confusion between lighthouses established by The Panama Canal and the Republic of Panama; the right of the Republic of Panama to refuse to honor a request for the extradition of a citizen of Panama from the Republic of Panama to the Canal Zone; the boundary convention between The Panama Canal and the Republic of Panama, changing the boundaries in the district known as Las Savanas and in the water of Colon Bay; the payment of 40 per cent of the face value of United States postage due stamps used in Canal Zone post offices to the Republic of Panama; the fire in the city of Colon April 30, 1915, the rebuilding of the city, and the housing and care of the refugees; the construction of lighthouses at Cape Mala and Bona Island; the prevention of the sale of liquor near Canal Zone boundaries; and the right of Panama to collect import duties on material for fuel-oil tanks in the Canal Zone.

It has been difficult to secure the cooperation of Panama respecting measures necessary for the public health in Panama city and Colon, and it seems probable that (as contemplated by the treaty) greater executive powers may have to be exercised in those cities to accomplish the ends desired.

The Taft agreement has become in many respects disadvantageous to both Governments and should be superseded by an agreement more in accord with our present mutual needs and with our rights under the treaty.

LEGISLATION.

An appendix to the Governor's report contains the acts of Congress affecting The Panama Canal and the Executive orders relating to the Canal Zone.

Respectfully submitted.

C. A. McIlvaine,
Executive Secretary.

Maj. Gen. Geo. W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

APPENDICES TO THE REPORT OF THE EXECUTIVE SECRETARY.

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Table 2. Statement, by months, of estates of deceased and insane employees administered.
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Table No. 1.—*Statement of vessels entered and cleared and of seamen shipped and discharged at Balboa and Cristobal, fiscal year 1915.*

	Vessels entered.			Vessels cleared.			Seamen shipped.			Seamen discharged.		
	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.	Balboa.	Cristobal.	Total.
July	28	29	57	28	26	54	88	7	95	77	7	84
August	40	52	92	40	50	90	30	13	43	77	4	81
September	49	78	127	51	70	121	19	7	26	10	1	11
October	55	95	150	52	101	153	2	5	7	7	2	9
November	60	94	154	57	94	151	14	1	15	24	3	27
December	76	114	190	79	109	188	8	9	17	29	7	36
January	84	111	195	84	110	194	24	6	30	5	4	9
February	77	119	196	77	125	202	12	34	46	4	13	17
March	116	138	254	116	136	252	1	183	184	21	160	181
April	90	135	225	93	137	230	9	184	193	8	186	194
May	103	144	247	107	142	249	22	167	189	10	134	144
June	90	158	248	86	155	241	4	184	188	3	145	148
Total	868	1,267	2,135	870	1,255	2,125	233	800	1.033	275	666	941

TABLE NO. 2.—*Statement showing number of estates received and settled, and amount of funds handled, during fiscal year ended June 30, 1915.*

By months.	Number received.	Number settled.	Amount of funds collected.	Value of estates settled.
Balance of unsettled estates and cash on hand on July 1, 1914	20	....	$2,556.76	....
1914				
July	31	32	1,288.55	$2,048.25
August	18	13	3,348.70	199.94
September	42	38	2,703.63	2,981.48
October	27	36	536.11	1,323.49
November	18	11	1,089.15	619.95
December	14	26	401.35	2,011.96
1915				
January	21	13	1,219.64	735.20
February	24	24	1,699.25	734.44
March	29	36	820.78	1,081.51
April	13	16	1,641.41	961.87
May	9	8	366.58	1,289.50
June	16	15	1,398.39	1,536.42
Total estates and cash handled	282	268	19,070.30	15,524.01

Number of unsettled estates on hand June 30, 1915	14
Balance of cash on deposit with collector on June 30, 1915	$3,643.89

TABLE NO. 3.—*Postal receipts and expenses.*

	1914	1915		1914	1915
POSTAL RECEIPTS.			POSTAL EXPENSES.		
Stamp sales	$90,814.45	$74,843.88	Salaries	$98,899.15	$86,801.29
Second-class mail	441.85	988.50	Transportation of mails	26,758.00	24,976.07
Money-order fees	19,408.44	13,169.55	Purchase of stamps	36,403.29	28,385.60
Miscellaneous receipts	77.49	67.78	Corral service	4,389.40	4,315.23
Panama Railroad mail	....	3,750.00	Stationery, printing, etc	3,616.87	3,077.05
Box rents	....	2,974.65	Repairs to buildings	2,725.60	290.38
			Furniture and fixtures	1,060.55	1,416.99
Total	110,742.23	95,794.36	Electric light and electrical repairs	847.14	560.99
			Miscellaneous	563.42	1,290.49
			Total	175,263.42	151,121.59
			Deficit	64,521.19	55,327.23

TABLE NO. 4.—*Business of Canal Zone postal system for the fiscal year ended June 30, 1915.*

	Money orders.			
	Number of orders issued.	Amount issued.	Fees.	Total amount money orders paid.
Ancon	37,934	$780,257.63	$3,243.27	$216,758.95
Balboa	26,722	668,691.76	2,219.12	215,233.21
Balboa Heights	9,235	257,728.05	887.47	103,825.84
Corozal	13,249	367,633.55	1,121.39	131,187.41
Cristobal	39,672	953,131.60	3,534.77	268,721.50
Culebra	5,699	96,348.40	393.13	34,696.59
Empire	5,398	90,779.46	384.56	27,469.11
Gatun	9,918	200,485.40	721.96	72,508.27
Las Cascadas	4,948	93,143.65	290.65	46,014.24
Paraiso	11,703	282,422.01	917.91	87,101.75
Pedro Miguel	6,080	158,131.33	474.69	58,706.58
	....	....	14,188.92	....
Invalidated money orders paid by warrant	....	....	....	1,500.00
Refund of fees on account of European war	....	....	19.37	....
Liquidation of defalcation	....	....	1,000.00	....
Total	170,558	3,948,752.84	13,169.55	1,263,753.45

TABLE No. 4.—*Business of Canal Zone postal system for the fiscal year ended June 30, 1915*—Continued.

	Postal receipts.				
	Stamp sales.	Postage due, stamp sales.	Box rents.	Second-class postage.	Total.
Ancon	$17,407.20	$2,379.00	$852.00	$986.60	$21,624.80
Balboa	7,439.60	1,436.90	378.00	....	9,254.50
Balboa Heights	3,085.11	279.96	530.00	....	3,895.07
Corozal	3,068.95	478.95	181.50	....	3,729.40
Cristobal	18,565.13	2,885.08	588.00	1.90	22,040.11
Culebra	2,237.18	313.51	24.00	....	2,574.69
Empire	2,600.28	439.54	31.15	....	3,070.97
Gatun	2,810.76	716.78	119.00	....	3,646.54
Las Cascadas	3,085.27	96.51	20.50	....	3,202.28
Paraiso	2,472.15	669.05	190.50	....	3,331.70
Pedro Miguel	1,360.57	147.69	60.00	....	1,568.26
Station B	398.42	24.77	....	....	423.19
Frijoles	20.67	3.64	....	....	24.31
Gamboa	336.07	73.45	....	....	409.52
Depot quartermaster, Mount Hope	255.00	....	....	....	255.00
Executive secretary	27.50	....	....	....	27.50
Storekeeper, supply department, Balboa	85.00	....	....	....	85.00
Panama Railroad, Balboa docks	2.60	....	....	....	2.60
	....	....	2,974.65	....	79,165.44
Refund of box rents paid in advance	....	....	1.00	....	1.00
Total	65,257.46	9,944.83	2,973.65	988.50	79,164.44

TABLE No. 5.—*Postal savings-bank transactions for the fiscal year ending June 30, 1915.*

	Deposit money orders.			Postal savings certificates.	
	Issued.	Paid.	Balance on deposit June 30, 1915.	Balance unpaid July 1, 1914.	Deposits.
Ancon	$135,875	$94,980	$40,895	$65,692	$167,222
Balboa	213,580	139,965	73,615	75,847	114,348
Balboa Heights	61,120	41,260	19,860	....	....
Corozal	126,405	93,985	32,420	92,480	127,540
Cristobal	216,755	129,490	87,265	72,433	168,399
Culebra	28,745	22,370	6,375	33,251	31,621
Empire	21,890	13,690	8,200	27,631	17,586
Gatun	67,515	45,665	21,850	35,643	64,308
Las Cascadas	44,720	35,255	9,465	10,120	13,438
Paraiso	97,285	63,405	33,880	44,592	52,710
Pedro Miguel	61,680	42,615	19,065	40,792	47,579
Total	1,075,570	722,680	352,890	498,481	804,751

	Postal savings certificates.			
	Transfers in.	Transfers out.	Withdrawals.	Balance on deposit June 30, 1915.
Ancon	$1,325	$810	$193,249	$40,180
Balboa	1,352	1,070	180,058	10,419
Corozal	150	670	190,662	28,838
Cristobal	4,671	260	238,154	7,089
Culebra	1,345	1,678	64,539	....
Empire	63	3,270	42,010	....
Gatun	965	2,507	86,969	11,440
Las Cascadas	....	13	23,545	....
Paraiso	2,125	451	91,132	7,844
Pedro Miguel	1,258	2,525	68,253	18,851
Total	13,254	13,254	1,178,571	124,661

TABLE NO. 6.—*Amount of money orders, by offices, payable to the remitter and drawn on the issuing office, remaining unpaid on June 30, 1915.*

Name of post office.	Deposit paid money orders.	Nontransferable deposit money orders.	Total.
Ancon	$11,864.50	$40,895.00	$52,759.50
Balboa	8,127.00	73,615.00	81,742.00
Balboa Heights	150.00	19,860.00	20,010.00
Corozal	2,496.50	32,420.00	34,916.50
Cristobal	4,168.50	87,265.00	91,433.50
Culebra	630.70	6,375.00	7,005.70
Empire	1,619.00	8,200.00	9,819.00
Gatun	1,301.00	21,850.00	23,151.00
Las Cascadas	....	9,465.00	9,465.00
Paraiso	2,368.50	33,880.00	36,248.50
Pedro Miguel	1,056.00	19,065.00	20,121.00
Total	33,781.70	352,890.00	386,671.70

TABLE NO. 7.—*Number and destination of dispatches of mail by the exchange office at Cristobal during the fiscal year ended June 30, 1915.*

Destination.	Number of dispatches.	Destination.	Number of dispatches.
New York, by Panama Railroad and United Fruit Co. steamers	145	Granada	26
New Orleans	53	Montserrat	25
Jamaica	68	Nevis	20
Barbados and distribution	26	St. Kitts	18
Trinidad and distribution	32	St. Lucia	26
French lines, Colon-Bordeaux, Colon-St. Nazaire	28	St. Vincent	26
Martinique	24	Colombia	60
Guadeloupe	28	Costa Rica	56
Antigua	25	Colon, Republic of Panama	303
British Guiana	26	Bocas del Toro, Republic of Panama	27
Dominica	21	Almirante, Republic of Panama	7
		Total	1,114

TABLE NO. 8.—*Letters and parcels registered, by offices, during the fiscal years ended June 30, 1915.*

Name of post office.	Domestic letters registered.	Domestic parcels registered.	Foreign letters registered.	Foreign parcels registered.	Official registered free.	Distribution registered. free.	Total.
Ancon	4,749	782	9,889	620	5,479	119	21,638
Balboa	2,393	472	3,698	178	5,054	74	11,869
Balboa Heights	1,086	207	489	15	34,362	41	36,200
Corozal	961	249	956	31	2,039	220	4,456
Cristobal	5,571	790	9,941	642	8,723	710	26,377
Station B	132	122	59	3	566	5	877
Culebra	585	172	803	12	2,458	60	4,090
Empire	866	181	510	33	3,064	279	4,933
Gamboa	215	27	323	12	361	....	938
Gatun	724	132	1,151	25	2,985	264	5,281
Las Cascadas	680	136	245	8	780	98	1,947
Paraiso	887	128	1,040	111	2,624	146	4,936
Pedro Miguel	364	104	396	11	1,635	72	2,582
Total	19,213	3,502	29,500	1,701	70,130	2,088	126,134

Table No. 9.—*Number of insured and C. O. D. parcel-post parcels and registered articles delivered, by offices, during fiscal year ended June 30, 1915.*

Name of post office.	Number of insured and C. O. D. parcels.	Number of registered articles.	Total.	Name of post office.	Number of insured and C. O. D. parcels.	Number of registered articles.	Total.
Ancon	2,737	12,360	15,097	Gamboa	24	1,273	1,297
Balboa	956	6,621	7,577	Gatun	506	4,577	5,083
Balboa Heights	1,072	22,247	23,319	Las Cascadas	396	1,458	1,854
Corozal	698	4,665	5,363	Paraiso	383	3,534	3,917
Cristobal	2,369	21,462	23,831	Pedro Miguel	424	2,775	3,199
Station B	100	570	670				
Culebra	315	2,580	2,895	Total	10,433	86,250	96,683
Empire	453	2,128	2,581				

Table No. 10.—*Number of pouches, sacks, and registered sacks handled by railway mail messengers during the fiscal year ended June 30, 1915.*

Month.	Pouches.	Sacks.	Registered sacks.	Total.
1914.				
July	4,424	1,371	429	6,224
August	4,117	1,284	476	5,877
September	4,371	1,425	408	6,204
October	4,083	1,566	433	6,182
November	4,295	1,783	490	6,568
December	4,652	2,039	522	7,213
1915.				
January	4,067	1,113	317	5,497
February	4,038	1,623	298	5,959
March	4,546	1,465	436	6,347
April	4,505	1,254	482	6,241
May	4,796	1,777	451	7,024
June	4,961	1,357	496	6,814
Total	52,855	18,057	5,238	76,150

Table No. 11.—*Police personnel.*

STRENGTH OF POLICE SECTION ON JUNE 30, 1915.

Official title.	Authorized.	Actual.	Official title.	Authorized.	Actual.
Chief of division	1	1	First-class policemen	100	97
Police inspector	1	1	Policemen	60	57
Captains	3	3			
Lieutenants	5	5	Total	182	176
Sergeants	12	12			

TABLE NO. 11.—*Police Personnel*—Continued.

ACTUAL STRENGTH OF POLICE PERSONNEL ON JUNE 30, 1904, TO JUNE 30, 1915.

Official title.	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915
Chief of police	1	1	1	1	1	1	1	1	1	1	1	1
Assistant chief of police	......	......	......	......	......	......	1	1	1	1	......	......
Chief clerk	......	1	1	1	1	1	......	......	......	......	......	......
Senior clerk	......	......	......	......	......	......	1	1	1	1	1	......
Clerks	1	4	5	6	8	5	4	4	4	4	5	......
Copyist	......	......	......	......	1	......	......	......	......	......	......	......
Inspectors	......	......	......	......	......	......	2	2	2	1	1	1
Captains	......	......	......	......	......	......	......	......	......	......	......	3
First lieutenant	1	1	1	1	1	1	......	......	......	......	......	......
Second lieutenant	......	......	1	1	1	1	......	......	......	......	......	......
Lieutenants	......	......	......	......	......	......	4	4	4	3	3	5
First-class sergeants	......	4	9	6	......	......	......	......	......	......	......	......
Sergeants	6	4	9	6	10	11	8	8	8	8	7	12
Corporals	2	3	15	13	18	18	20	20	19	15	15	......
First-class policemen	......	16	23	59	108	117	112	114	114	111	99	97
Policemen	75	98	155	90	93	96	111	115	107	89	68	57
Policeman, launch engineer	......	......	......	......	......	1	......	......	......	......	1	......
Police launch sailor	......	......	......	......	......	1	......	......	......	......	......	......
Market keeper	......	......	......	......	......	......	......	......	......	......	1	......
Messenger	......	......	......	......	......	......	......	......	......	......	1	......
Total	86	132	220	184	242	253	264	270	261	234	203	176

TABLE NO. 12.—*Actual strength of stations and substations.*

Station and substation.	On July 1, 1914.	On June 30, 1915.	Station and substation.	On July 1, 1914.	On June 30, 1915.
Headquarters	11	3	Empire—Continued.		
Detective force	4	4	Frijoles	1	....
Ancon	18	9	Cristobal	50	46
Las Sabanas	1	....	Colon Hospital	1	....
Balboa	26	[1] 42	Frijoles	....	1
Naos	1	....	Gamboa	....	1
Corozal	4	6	Gatun	16	13
Pedro Miguel	15	31	Monte Lirio	1	1
Paraiso	3	....	Penitentiary	21	18
Empire	20	....			
Culebra	9	1	Total	203	176
Gamboa	1	....			

[1] Central station after reorganization.

TABLE NO. 13.—*Number of arrests, by fiscal years, made in Canal Zone since organization.*

Periods.	Arrests.	Periods.	Arrests.
June 2, 1904, to June 30, 1905	2,130	July 1, 1911, to June 30, 1912	7,055
July 1, 1905, to June 30, 1906	3,748	July 1, 1912, to June 30, 1913	6,827
July 1, 1906, to June 30, 1907	5,831	July 1, 1913, to June 30, 1914	4,911
July 1, 1907, to June 30, 1908	6,075	July 1, 1914, to June 30, 1915	5,157
July 1, 1908, to June 30, 1909	6,275		
July 1, 1909, to June 30, 1910	6,947	Total	60,915
July 1, 1910, to June 30, 1911	5,959		

TABLE NO. 14.—*Number of arrests, by months, made during the fiscal year ended June 30, 1915.*

Months.	Males.	Females.	Total.	With warrant.	Without warrant.
1914.					
July	577	26	603	116	487
August	409	17	426	75	351
September	496	15	511	66	445
October	479	23	502	77	425
November	340	16	356	56	300
December	365	19	384	70	314
1915.					
January	341	35	376	73	303
February	309	22	331	57	274
March	387	23	410	75	335
April	394	30	424	73	351
May	400	31	431	84	347
June	372	31	403	83	320
Total	4,869	288	5,157	905	4,252

TABLE NO. 15.—*Statement of convictions of persons arrested during fiscal year ended June 30, 1915.*

Month.	Total arrested.	Convicted.	Dismissed.	Continued.	Died while in custody.	To insane asylum.	To military and naval authorities.	To quarantine authorities.	To Panama authorities.	Extradited to United States.	Bail forfeited.	Released on own recognizance (failed to appear).	To British consul (deserters from merchant vessels).	Returned to merchant vessels.	Per cent convicted.
1914.															
July	603	481	116	....	....	1	5	....	....	....	....	....	....	....	80.57
August	426	347	50	....	....	1	26	....	1	1	....	....	....	....	87.40
September	511	421	74	....	....	....	13	1	....	....	2	....	....	....	85.05
October	502	412	86	....	....	1	1	....	....	....	1	1	....	....	82.72
November	356	285	62	....	....	3	2	....	....	....	....	....	3	1	82.13
December	384	305	66	1	....	1	10	....		....	1	....	....	....	82.00
1915.															
January	376	298	66	....	1	1	7	....	1	....	....	....	....	2	81.86
February	331	262	52	....	....	2	10	1	2	1	1	....	....	....	83.44
March	410	304	87	....	1	....	12	....	4	1	1	....	....	....	77.75
April	424	344	72	....	....	1	4	....	2	....	1	....	....	....	82.69
May	431	337	84	4	....	....	1	....	....	1	3	....	....	1	79.29
June	403	311	77	2	....	....	7	....	1	....	5	....	....	....	79.74
Total	5,157	4,107	892	7	2	11	98	2	11	4	15	1	3	4	82.04

Number of males arrested	4,869
Number of females arrested	288
Total	5,157

TABLE NO. 16.—*Charges against persons arrested during the fiscal year ended June 30, 1915.*

Offense.	Male.	Female.	Total.
Abandonment		1	1
Adultery	3	2	5
Alighting from moving train	73		73
Assault	25	2	27
Assault and battery	193	24	217
Assault with deadly weapon	25		25
Assault with intent to commit robbery	1		1
Assault with intent to commit rape	1		1
Attempt to commit grand larceny	1		1
Attempt to commit larceny	1		1
Attempt to defraud	29		29
Attempt to kill	2		2
Attempt to poison human beings	1		1
Battery	158	15	173
Boarding moving train	77	1	78
Bringing stolen property in the Canal Zone	22		22
Burglary	40		40
Carnal abuse of children	1		1
Carrying concealed weapons	32		32
Carrying firearms without a permit	1		1
Causing false arrest	1	1	2
Civil order of arrest	6		6
Conspiracy	3		3
Contempt of court	21	1	22
Crime against nature	2		2
Crime against public decency	1		1
Cruelty to animals	88	1	89
Desertion from United States Army	61		61
Desertion from United States Navy	1		1
Desertion from merchant vessel	6		6
Detained as witness	3		3
Disorderly conduct	726	131	857
Disturbing the peace	117	19	136
Embezzlement	32	2	34
Escaping from custody	4		4
Extortion	1		1
Extradition	5		5
False personation	6		6
False pretenses	1		1
Falsifying evidence		1	1
Fighting	63	4	67
Forgery	5		5
Fraud	18	1	19
Fugitive from justice	12		12
Gambling	49		49
Grand larceny	97	2	99
Having firearms without permit	20		20
Having stolen property in possession	1		1
Held for deportation	8	4	12
Held for extradition	2		2
Held for investigation	5	1	6
Held for quarantine authorities	3		3
Homicide	2		2
Hunting with trap	1		1
Indecent exposure	11		11
Insanity	8	2	10
Interfering with an officer			
Intoxication	134	1	135
Intoxication and disorderly	150	1	151
Lewd and lascivious cohabitation	25	23	48
Loitering	1,009	6	1,015
Maintaining public nuisance	1		1
Malicious destruction of property	4		4
Malicious displacement of switch	1		1
Malicious mischief	49	2	51
Manslaughter	2		2
Murder	2		2
Nonsupport	23		23
Obscene and indecent language	3		3
Obtaining money by false pretenses	3		3
Obtaining property by false pretenses	1		1
Peddling among men at work	3		3
Perjury	1		1
Petit larceny	444	7	451
Prostitution		2	2
Purchasing Government property from soldiers	3		3
Rape	2		2
Receiving stolen property	4		4
Resisting an officer	8		8
Returning to Canal Zone after being deported therefrom	6		6
Riding on platform of train	14		14
Robbery	5		5
Seduction	2		2
Straggling from United States Army	33		33
Straggling from United States Navy			
Threat	1		1
Trespass	23		23
Trespassing on railroad train	166		166
Unauthorized riding on labor train	27		27
Vagrancy	378	9	387
Violation of—			
Automobile regulations	25		25
Bicycle regulations	24	1	25
Bird law	2		2
Building regulations	25		25
Chauffeur's ordinance	7		7
Coach tariff regulations	52	3	55
Immigration regulations	2		2
Impounding ordinance	18		18
License regulations	21	1	22
Liquor regulations	57	9	66
Navigation regulations	5		5
Opium act	8		8
Ordinance for the licensing and regulation of motor vehicles	4		4
Postal regulations	1		1
Poster regulations	1		1
Quarantine regulations	16		16
Sanitary regulations	111	9	120
Speed regulations	31		31
Water regulations	9		9
White slave act	1		1
Writing obscene and indecent literature	1		1
Total	5,024	289	5,313

TABLE NO. 17.—*Nationality of persons arrested during the fiscal year ended June 30, 1915.*

Nationality.	Number.	Nationality.	Number.
Arabia	1	Great Britain—Continued	
Argentine Republic	4	British West Indies—Continued.	
Austria	5	Montserrat	32
Belgium	3	Nevis Island	2
Brazil	2	New Providence	59
Bulgaria	1	St. Kitts	36
Chile	22	St. Lucia	62
China	72	St. Vincent	53
Colombia	205	Tobago Island	1
Costa Rica	22	Tortola Island	1
Cuba	18	Trinidad	96
Denmark	7	Turks Island	10
Danish West Indies—		Watling Island	1
Saba Island	1	Greece	30
St. Thomas	9	Guatemala	6
Ecuador	23	Haiti	25
France	6	Holland	5
French Guiana	3	Dutch Guiana	1
French West Indies—		Dutch West Indies—Curacao	4
Guadeloupe	71	Honduras	9
Martinique	220	Italy	32
St. Martins	1	Tripoli	1
Madagascar	1	Japan	1
Germany	19	Liberia	1
Great Britain:		Mexico	18
Australia	1	Nicaragua	24
British Guiana	50	Norway	15
British Honduras	1	Panama	368
Canada	5	Peru	95
England	31	Portugal	5
India	76	Roumania	2
Ireland	8	Russia	3
New Zealand	1	Finland	2
Scotland	8	Santo Domingo	2
Straits Settlements	1	Salvador	8
British West Indies—		Spain	101
Antigua	62	Sweden	12
Bahama	1	Switzerland	1
Barbados	1,330	Turkey	2
Bermuda	13	Syria	2
Cayman	3	United States	400
Dominica	5	Philippines	2
Fortune Island	42	Porto Rico	6
Grenada	74	Venezuela	6
Inagua	3		
Jamaica	1,179	Total	5,157
Long Island	5		

TABLE NO. 18.—*Occupations of persons arrested during the fiscal year ended June 30, 1915.*

Occupation.	Number.	Occupation.	Number.
Agents	8	Cooper	3
Bakers	27	Cranemen	1
Barbers	6	Dishwashers	2
Bartenders	2	Diver	1
Blacksmiths	6	Domestics	231
Blacksmiths' helpers	2	Dredgemen	2
Boatmen	2	Dressmakers	3
Boiler makers	10	Drillmen	3
Brakemen	28	Electricians	10
Bricklayers	3	Electrician's helper	1
Broker	1	Engineers	23
Butchers	10	Farmers	120
Cable splicer	1	Firemen	68
Capitalist	1	Fishermen	21
Carpenters	124	Flagman	1
Car repairer	1	Foremen	45
Chauffeurs	31	Gardner	1
Checkers	14	Goldsmith	1
Civil engineers	2	Hostlers	2
Clerks	51	Inspectors	3
Coachmen	106	Ironworkers	10
Collector	1	Janitors	27
Conductors	6	Jewelers	2
Contractors	5	Laborers	2,455
Cooks	21	Laundresses	16

TABLE NO. 18.—*Occupations of persons arrested during the fiscal year ended June 30, 1915*—Continued.

Occupation.	Number.	Occupation.	Number.
Laundrymen	3	Pugilists	2
Linemen	4	Riggers	2
Machinists	17	Riveter	1
Machinists' helpers	5	Saddlers	2
Managers	5	Sailors	157
Masons	18	Salesmen	11
Masons' helpers	5	Saloon keepers	3
Merchants	38	Ships' officers	33
Messengers	13	Shoemakers	22
Midwives	3	Soldiers	140
Miners	3	Stevedore	1
Musician	1	Stewards	11
Newsboys	10	Storekeepers	4
No occupation	819	Student	1
Oilers	13	Superintendent	1
Orderlies	4	Switch tenders	16
Painters	31	Tailors	20
Peddlers	64	Teamsters	44
Physicians	3	Telephone operators	3
Piano tuner	1	Timekeepers	9
Pipefitters	6	Tinsmiths	2
Plasterers	9	Toolmaker	1
Plumbers	7	Upholsterer	1
Policemen	9	Waiters	15
Postmaster	1	Watchmen	22
Powderman	1	Water boys	9
Printers	2	Winchmen	4
Prospector	1		
Prostitutes	3	Total	5,157

TABLE NO. 19.—*Crimes committed by convicts confined in penitentiary on June 30, 1915, and their aggregate sentences.*

Crime	Number.	Years.	Months.
Assault with deadly weapon	7	7	9
Attempt to murder	1	1	6
Attempt to poison human beings	1	2	....
Burglary	5	10	3
Burglary, first degree	3	3	....
Burglary, first degree, and grand larceny	2	4	6
Burglary, second degree	2	2	4
Burglary, second degree, and grand larceny	1	1	....
Burglary in daytime	1	......	9
Crime against nature	1	1	6
Embezzlement	2	1	6
Forgery	2	4	....
Grand larceny	11	18	11
Highway robbery	1	1	6
Incest	2	10	....
Manslaughter	3	13	6
Murder, first degree	2	Life.	
Murder, second degree	4	71	....
Rape	2	12	....
Returning to Canal Zone after deportation therefrom	2	1	9
Total	58	168	9

TABLE NO. 20.—*Occupations of the convicts confined in the penitentiary on June 30, 1915.*

Occupation.	Number.	Occupation.	Number.
Barber	1	Painter	2
Brakeman	1	Powderman	2
Carpenter	2	Sailor	4
Clerk	1	Shoemaker	2
Coachman	1	Tailor	1
Cook	1	Teamster	1
Farmer	4	Timekeeper	1
Laborer	24	Waiter	2
Lineman	1	Watchman	1
Mason	1		
Merchant	1	Total	58
No occupation	4		

TABLE No. 21.—*Nationality of the convicts confined in the penitentiary on June 30, 1915.*

Native of—	Number.	Native of—	Number.
Colombia	1	Great Britain—British West Indies—Continued.	
Costa Rica	2	Trinidad	2
France—French West Indies: Martinique	4	Turks Island	1
Great Britain—British West Indies:		Italy	1
Antigua	1	Nicaragua	1
Bahamas	1	Panama	9
Barbados	16	Peru	1
Grenada	2	Spain	1
Jamaica	9	United States	2
New Providence	1		
St. Kitts	1	Total	58
St. Lucia	2		

TABLE No. 22.—*Ages of the convicts confined in the penitentiary on June 30, 1915.*

Age.	Black.	White.	White Americans.	Total.
10 to 15 years				
15 to 20 years	2			2
20 to 30 years	32	2		34
30 to 40 years	13		1	14
40 to 50 years	6			6
50 to 60 years	1			1
60 to 70 years	1			1
Total	55	2	1	58

Age of youngest prisoner (years)	19
Age of oldest prisoner (years)	67
Able to read and write	34
Unable to read and write	24

TABLE No. 23.—*Causes of deaths investigated by the coroner during the fiscal year ended June 30, 1915.*

Causes.	Number.	Causes.	Number.
Acute nephritis	1	Suicide	6
Drowning, accidental	36	Traumatism	35
Electrocution, accidental	2	Traumatism, railroad	5
Explosions	2	No definite cause	1
Gunshot wound	1		
Homicide	7	Total	103
Shock, electric	7		

TABLE No. 24.—*Nationality of persons whose deaths were investigated by the coroner during the fiscal year ended June 30, 1915.*

Nationality.	Number.	Nationality.	Number.
China	1	Great Britain—Continued.	
Colombia	2	British West Indies—Continued.	
Curaçao	1	Jamaica	33
Denmark	1	Montserrat	1
France	1	St. Lucia	1
French West Indies—		Trinidad	1
Guadeloupe	1	Haiti	1
Martinique	7	Panama	4
Great Britain:		Peru	2
British Guiana	1	Spain	1
British West Indies—		United States	14
Barbados	24	Unknown	3
Fortune Island	1		
Grenada	2	Total	103

TABLE NO. 25.—*Statement of accidents involving personal injuries investigated during the fiscal year ended June 30, 1915.*

Nationality.	Panama Canal employees.	Panama Railroad employees.	Non-employees.	Unknown.	Total.
Argentine Republic	1		1		2
China			1		1
Colombia	1		1		2
Costa Rica	1		1		2
Denmark: Danish West Indies—			1		1
France: French West Indies:					
Guadeloupe	1	2	1		4
Martinique	4	2	2		8
Great Britain:					
India	1				1
British West Indies:					
Antigua	3	1			4
Barbados	49	15	5		69
British Guiana	1	1	1		3
Fortune Island		6			6
Grenada	11	1			12
Jamaica	51	23	11		85
Montserrat	4		1		5
New Providence	1				1
St. Kitts	1				1
St. Lucia	1				1
St. Vincent	13				13
Trinidad	5	1	1		7
Turks Island			1		1
Haiti	1				1
Holland: Dutch Guiana		1			1
Mexico			1		1
Nicaragua		1			1
Panama	2	1	3		6
Peru			2		2
Russia: Finland	1				1
Spain	5		1		6
United States	30	5	8		43
Unknown				2	2
Total	188	60	44	2	294

TABLE NO. 26.—*Fire personnel June 30, 1915.*

Official title.	July 1, 1914.		June 30, 1915.	
	Authorized.	Actual.	Authorized.	Actual.
Fire inspector	1	1	1	1
Captains	4	3	2	2
Lieutenants	6	6	6	6
Engineer (steam—fire)	1	1		
Motor engineer	1	1		
Motor inspector			1	1
Electrician [1]	1	1		
Operators			5	4
Firemen	33	30	29	29
Lineman [1]	1	1		
Total	48	44	44	43

[1] Wireman and lineman transferred to electrical division Apr. 1, 1915.

TABLE NO. 27.—*Distribution of fire personnel, by stations, June 30, 1915.*

	Fire inspector.	Captain.	Lieutenant.	Motor inspector.	Operator.	Fireman.	Total paid force.	Volunteer firemen.	Total.
Headquarters	1	......	......	......	......	......	1	......	1
Balboa central station	......	1	2	1	1	7	12	20	32
Ancon	......	......	1	......	1	4	6	......	6
Corozal	......	......	......	......	......	4	4	19	23
Pedro Miguel	......	......	......	......	......	1	1	20	21
Paraiso	......	......	......	......	......	2	2	20	22
Cristobal central station	......	1	2	......	2	7	12	......	12
Gatun	......	......	1	......	......	4	5	20	25
Monte Lirio	......	......	......	......	......	......	......	2	2
Gamboa	......	......	......	......	......	......	......	16	16
Frijoles	......	......	......	......	......	......	......	4	4
Total	1	2	6	1	4	29	43	121	164

TABLE NO. 28.—*Statement of damage resulting from fires during the fiscal year ended June 30, 1915.*

Month.	The Panama Canal.	Panama Railroad.	United States Army.	Private property in the Canal Zone.	Total.
1914.					
July	$360.00	$5.00	....	....	$365.00
August	294.00	....	....	$10.00	304.00
September	5.00	....	....	....	5.00
October	150.00	....	....	....	150.00
November	17.00	....	....	....	17.00
December	10.00	85.00	....	.50	95.50
1915.					
January	57.50	15.00	....	....	72.50
February	15.00	10.00	....	....	25.00
March	382.55	15.00	$27,500.00	....	27,897.55
April	12,502.40	10,025.00	....	....	22,527.40
May	3.00	....	....	101,500.00	101,503.00
June	50.00	....	....	275.00	325.00
Total	13,846.45	10,155.00	27,500.00	101,785.50	153,286.95

TABLE NO. 29.—*Statement of fires and losses and property involved compared with similar data of previous years.*

Fiscal year.	Number of fires.	False alarms.	Total damage.	Total property involved.
1906–7	45	....	$100,000.00	$1,300,000.00
1907–8	71	12	46,170.50	1,097,619.45
1908–9	92	6	16,934.92	1,624,893.65
1909–10	123	10	3,237.04	1,212,335.19
1910–11	238	14	53,877.44	2,256,210.01
1911–12	315	18	12,653.58	1,826,995.58
1912–13	202	18	22,520.97	1,041,430.19
1913–14	207	8	21,376.96	1,993.012.61
1914–15	142	13	153,286.95	2,465,654.18

TABLE NO. 30.—*Monthly enrollment and average daily attendance.*

	White schools.			Colored schools.		
	Monthly enrollment.		Average daily attendance.	Monthly enrollment.		Average daily attendance.
	Gross.	Net.		Gross.	Net.	
1914.						
October	1,111	1,062	991.7	1,028	980	779.1
November	1,357	1,090	1,084.6	1,127	1,072	815.6
December	1,321	1,033	985.2	1,148	1,092	768.4
1915.						
January	1,437	1,074	946.6	1,322	1,250	795.6
February	1,552	1,101	990.1	1,382	1,304	718.1
March	1,605	1,114	925.7	1,495	1,353	751.1
April	1,722	1,128	888.7	1,575	1,399	692.8
May	1,737	1,139	859.5	1,599	1,420	623.8
June	1,777	1,146	843.5	1,612	1,430	658.1

TABLE NO. 31.—*Enrollment for the year, by schools.*

	Gross.	Net.
WHITE SCHOOLS.		
Balboa high	84	79
Cristobal high	24	24
Grades:		
Ancon	298	208
Balboa	260	143
Corozal	185	148
Pedro Miguel	121	80
Paraiso	42	34
Culebra [1]	100	90
Las Cascadas [2]	24	24
Empire	71	18
Gatun	185	121
Cristobal	286	170
Colon Beach	97	7
Total	1,777	1,146
COLORED SCHOOLS.		
Ancon	353	341
La Boca	336	331
Paraiso	236	144
Gatun	171	127
Mount Hope [3]	28	28
Cristobal	488	459
Total	1,612	1,430
White	1,777	1,146
Colored	1,612	1,430
Total	3,389	2,576

[1] Culebra school closed Feb. 12, 1915; pupils transferred to Empire.
[2] Las Cascadas school closed Feb. 12, 1915; pupils transferred to Empire.
[3] Mount Hope school closed Dec. 31, 1914, pupils transferred to Gatun.

TABLE NO. 32.—*Enrollment by grades (net).*

	White schools.	Colored schools.	Total.
Grade I	232	466	698
Grade II	165	384	549
Grade III	148	185	333
Grade IV	133	222	355
Grade V	87	108	195
Grade VI	123	42	165
Grade VII	103	19	122
Grade VIII	52	4	56
Grade IX	46	....	46
Grade X	25	....	25
Grade XI	21	....	21
Grade XII	11	....	11
Total	1,146	1,430	2,576

Table No. 33.—*Number of teachers employed in schools.*

	White schools.	Colored schools.	Total.
1914.			
October	41	22	63
November	45	22	67
December	43	22	65
1915.			
January	42	21	63
February	42	21	63
March	45	20	65
April	42	20	62
May	42	20	62
June	39	20	59

Table No. 34.—*District court, Division of Balboa.*

Criminal cases:	
Pending July 1, 1914	6
Cases filed	215
Acquittals	41
Removed to United States	3
Convictions	165
Forfeitures	1
Nol-prossed	8
Dismissals	2
Cases pending June 30, 1915	1
Fines collected	$1,296.50
Forfeitures	$700
Civil cases:	
Pending July 1, 1914	21
Cases filed	41
Civil cases—Continued.	
Cases settled	42
Cases pending June 30, 1915	20
Costs	$402.35
Proceeds from marriage licenses, recording fees, notarial fees, and miscellaneous fees	$1,012.49
Proceeds from sale of Supreme Court reports	$60
Probate cases:	
Pending July 1, 1914	27
Cases filed	322
Cases settled	327
Cases pending June 30, 1915	22
Costs	(1)

Table No. 35.—*District court, Division of Cristobal.*

Criminal cases:	
Pending July 1, 1914	8
Cases filed	133
Acquittals	23
Transferred to Balboa	4
Convictions	94
Forfeitures	1
Nol-prossed	9
Dismissals	10
Cases pending June 30, 1915	0
Fines collected	$685
Forfeitures	$150
Civil cases:	
Pending July 1, 1914	15
Cases filed	51
Civil cases—Continued.	
Cases settled	33
Cases pending June 30, 1915	33
Costs	$344
Proceeds from marriage licenses, recording fees, notarial fees, and miscellaneous fees	$626.92
Probate cases:	
Pending July 1, 1914	9
Cases filed	17
Cases settled	14
Cases pending June 30, 1915	12
Costs	(1)

Table No. 36.—*Magistrate court, subdivision of Balboa.*

CRIMINAL CASES.

Month.	Cases filed.	Convicted.	Acquitted.	Committed to district court.	Dismissed.	Total collections (fines).
1914.						
Pending July 1	4					
July	284	237	23	20	8	$750.50
August	228	190	14	20	2	658.50
September	291	244	18	23	4	704.50
October	325	268	33	25	3	629.00
November	208	164	25	18		413.50
December	214	182	22	11		588.50
1915.						
January	193	154	24	12	2	549.50
February	164	135	14	13	2	573.00
March	201	153	39	9	1	604.50
April	280	210	52	13	4	557.30
May	207	151	34	20	3	253.00
June	156	115	35	5	1	356.50
Total	2,755	2,203	333	189	30	6,638.30

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[1] Included in costs noted under civil cases.

Forfeitures	$630
Cases pending June 30, 1915	None.

CIVIL CASES.

Cases pending July 1, 1914	3
Cases filed	138
Cases settled	137
Cases pending June 30, 1915	4
Costs	$405.84

TABLE NO. 37.—*Magistrate court, subdivision of Cristobal.*

CRIMINAL CASES.

Month.	Cases filed.	Convicted.	Acquitted.	Committed to district court.	Dismissed.	Total collections (fines).
1914.						
Pending July 1	1					
July	238	171	53	6	8	$619
August	129	101	18	5	5	485
September	219	163	34	19	3	285
October	177	131	29	6	11	315
November	151	120	16	9	8	304
December	153	99	29	15	11	242
1915.						
January	174	130	28	10	5	369
February	148	109	22	6	12	480
March	213	156	42	9	2	461
April	149	116	22	7	1	332
May	220	192	12	11	8	727
June	265	221	32	9	4	658
Total	2,236	1,709	337	112	78	5,277

Forfeitures	$205
Cases pending June 30, 1915	1

CIVIL CASES.

Cases pending July 1, 1914	2
Cases filed	164
Cases settled	162
Cases pending June 30, 1915	4
Costs	$416.38

APPENDIX K.

REPORT OF THE SPECIAL ATTORNEY.

Ancon, Canal Zone, *July 15, 1915.*

Sir: I have the honor to submit the following report on the business of this office for the fiscal year ended June 30, 1915:

ORGANIZATION.

Mr. Charles R. Williams, who heretofore held the position of attorney for the Panama Railroad Company and assistant to the special attorney, was appointed district attorney of the Canal Zone to succeed Mr. William K. Jackson, who resigned in June last. When Mr. Williams entered upon the duties of district attorney, the special attorney was assigned by you to act as counsel for the railroad company on the Isthmus, and Mr. Walter F. Van Dame was appointed assistant to the counsel for the railroad company and assistant to the special attorney. Therefore this report will also include the business of the Panama Railroad Company, which Mr. Williams had in charge until his appointment as district attorney. In all other respects the organization of the special attorney's office remains the same.

REVISION OF THE LAWS.

During the last fiscal year a number of Executive orders were submitted to the President for his approval and promulgation. Some of these contained new legislation, while others were amendments or modifications of Executive orders previously issued. The work of revising the laws of the Canal Zone so as to adapt them to the change from the construction period to that of operating the canal, was checked by reason of a decision of the Attorney General to the President, dated October 14, 1914, wherein it was held that the President was without power to alter or amend Executive orders issued prior to the passage of the Panama Canal Act. The opinion of the Attorney General was followed by one from the Judge Advocate General of the Army to the effect that the President was authorized to adopt rules and regulations for the administration of the canal, but that he was without power to enact penal legislation for the enforcement of those rules and regulations.

A number of Executive orders, which had been drafted in this office, were issued by the President prior to the date on which the Attorney General rendered his opinion.

The first of the Executive orders was issued on July 3, 1914, and is entitled "Executive order relating to certain duties of the clerk of the district court and his assistants." Under the old organization, the clerk of the circuit court at Ancon was ex officio registrar of property of the Canal Zone. When the circuit courts were abolished and one district court for the entire Canal Zone was substituted for them, the office of clerk of the circuit court at Ancon ceased to exist. It was thought that the clerk of the district court succeeded to the duties of the clerk of the circuit as ex officio registrar of property, but in my judgment that conclusion was extremely doubtful, and in consequence the Executive order above mentioned was drafted and submitted to the President for his approval and promulgation. The duties of registrar are ministerial and administrative, and the authority of the President to assign them to the clerk of the district court is unquestioned.

An Executive order entitled "Executive order to require ocean-going vessels to be equipped with wireless apparatus" was issued on July 9, 1914. The order requires all ocean-going steamers carrying passengers, plying between the Canal Zone and other ports, to be fitted with wireless apparatus, and a penalty is provided against vessels failing to observe the requirements. The laws of the United States, which require ocean-going vessels to be fitted with wireless apparatus, had not been extended previously to the Canal Zone.

An Executive order authorizing the board of admeasurements to administer oaths to witnesses and to compel their attendance was promulgated by the President, July 9, 1914. The purpose of the order was to authorize the compulsory attendance of witnesses before the board by means of court process.

An Executive order of a purely administrative nature was issued by the President on July 30, 1914, setting aside a certain area of land in the Canal Zone for the purposes of the Darien Naval Radio Station. It was the desire of the Navy Department to obtain jurisdiction over this area, but, inasmuch as all civil and political jurisdiction in the Canal Zone is vested in the Governor by the Panama Canal Act, the request of the Navy Department could not be complied with, though the area in question has been turned over to that department for all administrative purposes connected with the operation of the wireless station.

On August 3, 1914, the President issued an Executive order prescribing the duties of constables. This order was issued in conformity with section 7 of the Panama Canal Act, which empowers the President to prescribe the duties of magistrates and constables. There were no constables for the courts under the old organization, and consequently, when the office of constable was created by the Panama Canal Act, it became necessary to define the duties of constables.

The board of health of the Canal Zone was reorganized by the President under an Executive order dated August 6, 1914. The board of health was originally created by act No. 8, enacted by the Walker Commission, on September 2, 1904. The various changes in the officials of the health department resulting from the Executive orders issued by the President subsequent to the expiration of the Fifty-eighth Congress, impaired the organization of the board. The purpose of the Executive order was to remove the imperfections in the organization of the board of health, and thus reestablish it as an efficient administrative unit.

An Executive order was issued on August 8, 1914, which is, in effect, a customs regulation, and relates to ships' manifests. The customs service in the Canal Zone was established under the provisions of act No. 8 of the Walker Commission, enacted on September

2, 1904. The act provides that the service was to be administered pursuant to the customs laws, rules, and regulations of the United States not inapplicable to the Canal Zone and the enactments, rules, and regulations of the government of the Canal Zone then in force or thereafter to be adopted.

The penal laws of the Canal Zone contained no provisions defining crimes against the postal service; neither had the penal provisions of the postal laws of the United States been extended to the Canal Zone. In order to correct the deficiency, the President issued an Executive order on August 4, 1914, entitled "An Executive order relating to postal crimes in the Canal Zone." It provides that the postal laws and regulations of the United States, not locally inapplicable, which define crimes against the postal service and prescribe punishments therefor, shall apply to the Canal Zone and be enforceable in the Zone courts in the manner and form prescribed for other criminal cases by the Canal Zone laws.

An Executive order requiring litigants to give security for costs in civil cases was enacted by the President on August 14, 1914. The order was issued by virtue of the power vested in the President by the Panama Canal Act to establish rules of practice in the courts of the Canal Zone. The preexisting law relating to security for costs in civil cases was inadequate, and the Executive order furnishes a more complete and efficient procedure on the subject.

An Executive order was issued by the President in August, 1914, prescribing rules for the government of motormen and persons in control of street cars at street, road, and railway crossings, in order to avoid accidents, and providing a penalty in a case of a failure to observe the rules. There is a street-car system in the Canal Zone, owned by a private corporation, and the Executive order was issued at the instance of the company.

On July 9, 1914, the President adopted rules and regulations for the navigation of the Panama Canal and approaches thereto, including all waters under its jurisdiction. These regulations were prepared and submitted by the marine superintendent, with the aid of this office. It was discovered that the regulations provided for a penalty of $500, fixed, instead of a maximum fine of $500. In order to remove this defect, an Executive order of the President was issued on December 3, 1914, amending rule No. 2 and providing for a pecuniary fine not to exceed $500, instead of a fixed sum, as prescribed in the original regulation.

By Executive order of September 8, 1911, the President established a postal savings system in the Canal Zone. After the system had been in force for several years it was decided that it was cumbersome and unnecessary. The system was abolished by an Executive order dated September 5, 1914, which authorized the Canal Zone postal authorities to issue money orders payable at the office issuing them without the payment of postal fees. The new Executive order makes the post office serve the purpose of a postal savings bank, while the expense incident to the maintenance of a savings-bank accounting system is obviated.

The Walker Commission enacted a law against gambling, known as Act No. 4, approved August 22, 1904. The act in question prescribed a punishment not to exceed $500, or imprisonment not to exceed one year, or both such punishments, in the discretion of the court, against persons who played at any of the prohibited games; and a second or subsequent conviction carried with it a punishment of a fine of not less than $100 nor more than $1,000, or imprisonment of not more than two years, or both such punishments, in the discretion of the court. Owing to the high penalty authorized, cases could only be tried in the superior courts of the Canal Zone, where the defense might demand a jury trial though the offense is only a misdemeanor. In order to confer jurisdiction upon the police magistrates in these cases, an Executive order was issued on September 19, 1914, amending section 1 of the above-mentioned act of the Walker Commission. The other provisions of act No. 4, which relate to the keepers of gambling houses and gambling games, remain without amendment, and all such cases must be tried in the District or Superior Court of the Canal Zone, as formerly.

On September 19, 1914, the President, by Executive order, amended the previous order of March 20, 1914, relating to the compensation to be paid to injured employees of The Panama Canal and the Panama Railroad Company, by modifying the provisions of the original order which related to the method of distributing injury compensation among certain of the beneficiaries. This order was prepared by the auditor of The Panama Canal, with the aid of this office.

The order issued by the President on December 5, 1912, declaring that all lands in the Canal Zone were needed for canal purposes, and directing the chairman and chief engineer to take possession of the same on behalf of the United States, required the depopulation of the Canal Zone, except as to the agents, officials, and employees of the canal and the railroad, and other departments of the government, and those having business directly with the canal, who are allowed to remain on the Zone by special permission of the Governor.

The extinguishment of private titles in the Canal Zone, and the discontinuance of mercantile establishments, deprived the Canal Zone government of several sources of revenue. The situation needs a new revenue system. The old system is out of harmony with the existing conditions.

On October 13, 1914, the President issued an Executive order providing for certain license taxes and fees. This Executive order contains provisions repealing several previous orders upon the subject of taxation, which had been enacted prior to the passage of the Panama Canal Act. Further legislation on the subject of taxation is required to perfect the new system, but in view of the opinion of the Attorney General nothing more has been done in that direction.

Certain amendments to the Executive order of April 15, 1913, upon the subject of requiring maritime quarantine regulations for the Canal Zone and the harbors of the cities of Panama and Colon, were made, by Executive order of the President, issued on January 11, 1915. The amendments relate to the form of bills of health and supplemental bills of health, required from vessels touching at the ports of the Canal Zone, and the cities of Panama and Colon. The amendments are in the nature of administrative regulations, and, in my judgment, the President was fully authorized to enact the amending order.

A number of the above-mentioned Executive orders are not out of harmony with the opinion of the Attorney General or that of the Judge Advocate General, inasmuch as the orders in question contain provisions of an administrative character purely, and the President is authorized to establish regulations for the operation of the canal and its adjuncts, including the Canal Zone government, and to provide rules of practice for the courts. There are other orders of a substantive nature, however, that probably would not be acceptable under the opinion of the Attorney General or that of the Judge Advocate General. I refer specially to the Executive orders which contain penal provisions.

The Executive orders were drafted on the theory that the power to govern, conferred expressly on the President by the Panama Canal Act, carried with it the implied authority to enact the police rules necessary to make the power effective, and that this was especially so because the old organization, in existence during the period of construction, was abolished when the Isthmian Canal Commission was discontinued by the President. The same law that directed the President to abolish the commission and discontinue the old system required him thereafter to complete, govern, and operate the canal and to govern the Canal Zone. In addition, the letter from President Roosevelt dated May 9, 1904, addressed to the Secretary of War, which expressly conferred legislative power on the Canal Commission, and the Executive order of March 13, 1907, which authorized the commission to enact ordinances regulating police, sanitation and taxation, and any other matter then regulated by ordinance, are included in the laws and orders of the President which have been ratified by section 2 of the Panama Canal Act, and the power so conferred must be lodged in some one, either the President or the Governor.

Finding himself without an organization with which to govern and operate the canal and govern the Canal Zone when he abolished the commission, the President proceeded to establish a new system, and in doing so he discarded some of the Executive orders which had been ratified by section 2 of the Panama Canal Act and made material modifications in the provisions of other orders. His authority to do so seems plain. By the terms of the act the old organization ceased to exist when the commission was discontinued. In order to govern and operate the canal and govern the Canal Zone under the changed conditions a new organization was necessary. His first act was to reorganize the local system by creating new departments entirely inconsistent with old Executive orders. The reorganization required the enactment of Executive orders of a substantive nature as well as administrative, and the process was continued until the adverse opinions were rendered by the Attorney General and the Judge Advocate General.

Whatever may be said respecting the merits of the question raised by the Attorney General's opinion, no doubt exists about there being an imperative necessity for a revision of the Canal Zone laws in order to adapt them to the new conditions.

The suggestion that a revision of the laws be made and then submitted as a whole to Congress is not, in my judgment, a practical one. The canal and its adjuncts present problems that are new in administration. Although the canal is in operation, the construction period is still on. The defensive measures provided for the canal require the maintenance of a large body of troops here. The organization for the canal and its adjuncts and that for the armed forces stationed here must harmonize or else friction and inefficiency will result. The old Executive orders do not afford sufficient room for teamwork between the two organizations. With the canal in operation, there has necessarily followed some change in its relations with the Republic of Panama. The opening of the canal to traffic has brought it into close contact with the world's commerce. There is not sufficient scope in the old Executive orders to permit the President or his representative on the Isthmus to meet the questions that will constantly arise under the new order of things. Neither can a system of laws and regulations sufficiently elastic be drafted at once to meet the new conditions as they come. Changes and modifications in the existing laws will be necessary until the transition period is entirely over and the new organization firmly settled. In my opinion the President should be given full power to accomplish the desired end if he is without the power at this time. I recommend that a bill containing an amendment to section 2 of the Panama Canal Act be submitted to Congress for adoption. The amendment could be in the form of a redraft of section 2, as follows:

> SEC. 2. That all laws, orders, regulations, and ordinances adopted and promulgated in the Canal Zone by order of the President for the government and sanitation of the Canal Zone, and the sanitation of the cities of Panama and Colon and their adjacent harbors, and the construction and operation of the canal, are hereby ratified and confirmed as valid and binding without prejudice to the power of the President to alter, amend, or repeal the same.

Speaking generally of the foregoing Executive orders, it would seem expedient to continue to observe them, now that they have been promulgated and the canal authorities are acting under them, and especially because a number of them have been applied by the courts. It would seriously interfere with the administration of the Canal Zone at this time, should the Executive orders be ignored.

LAND MATTERS.

The land office of The Panama Canal, which also has charge of the lands of the Panama Railroad Company, continues under the jurisdiction of the special attorney. There has been no change in the organization of the land office.

The President's depopulation order of December 5, 1912, required the cancellation of all land leases issued by the canal authorties and the railroad company for lands in the Canal Zone. There are some few leases of the railroad company at Folks River and at one or two other points in the Canal Zone which have not been canceled.

In addition to the work of supervising the affairs of the land office, the special attorney's office has had the direction and supervision of land claims and claims for improvements, against the Government and the railroad company, arising from the President's order above mentioned, which required the canal authorities to take possession, on behalf of the United States, of all privately owned lands in the Canal Zone.

During the last fiscal year this office has settled by private agreement and paid 1,462 claims, aggregating the sum of $351,306.64, making a total of 3,595 claims settled and paid from January 1, 1913, to June 30, 1915, aggregating the sum of $507,825.14. The last annual report from this office contained a statement that 1,903 claims had been settled during the year 1913–14, and that 2,237 claims had been settled from January 1, 1913, to June 30, 1914. The statement in respect to the items just mentioned included claims that had not been paid on June 30, 1914, though agreements of settlement with the claimants had been made. The number of claims settled and paid during the fiscal year 1913–14 was 1,799, while 334 claims were settled and paid from January 1, 1913, to June 30, 1913. The foregoing items added to the 1,462 claims settled and paid during the fiscal year just ended aggregate 3,595 claims settled and paid between January 1, 1913, and June 30, 1915.

The claims settled and paid were mostly for improvements claimed by squatters and by Panama Railroad Company's lessees, whose houses were taken over for canal purposes, though there were several large land claims.

The land office has immediate charge of the investigation and settlement of claims, and for that purpose employs several inspectors, who visit the various properties, list improvements on them, and make report to the land office, together with their appraisal of the respective properties. These reports are used as a basis in making settlements, though the properties are often visited by the land agent and the special attorney. When buildings are to be valued the aid of the Quartermaster's Department is often obtained. If no agreement is reached with the claimants, the issues between them and the Government are, as a rule, submitted to the Joint Land Commission for determination.

The death of Mr. David Marks, one of the American members of the Joint Land Commission, on June 17, 1914, which was mentioned in my last annual report, delayed the work of the commission until September 17, 1914, when Judge Nicholas Cornet, who succeeded Mr. Marks, arrived on the Isthmus.

During the fiscal year 1914–15 the Joint Land Commission rendered 79 awards, comprising 85 docket numbers, aggregating the sum of $161,667.16. Ten of the awards were for land claims and the others were for improvements only. The commission dismissed 377 claims, 321 of which dismissals were based upon private settlements previously effected with the claimants by the land office.

The joint commission of 1913 met on the Isthmus in February of that year and continued in session until the autumn following, when the two American members resigned. The commission again convened in May, 1914, and continued in session throughout the last fiscal year, with the interruption of two months resulting from the death of Commissioner Marks.

During the period from February, 1913, to June 30, 1915, the land commission made 708 awards. The 708 awards aggregated the sum of $457,626.34. During the same period the commission dismissed 979 cases, the greater part of the dismissals being due to the claims having been previously settled by the land office.

When the commission reorganized, in May, 1914, it received joint instructions from the Governments of the United States and Panama, by which the presentation of claims before it was limited to a period of three months from the date on which the reorganized commission met on the Isthmus, except that in special cases the commission, in its discretion, might allow claims to be filed after the expiration of the three months, but in no case was the time for the filing of the claims to be extended beyond six months after the commission had reconvened.

The six months within which claims could be filed expired on March 27, 1915. On that date 3,593 claims had been filed, including several hundred that had been listed by the commission of 1913 on its own motion and for which no formal claims had been filed. These cases were not carried on the regular docket of the commission until 1914, when, I am informed, they were carried to the regular docket by the new commission.

A considerable number of the caes now on the docket of the commission have been settled and paid and are subject to dismissal when reached on call. Our records indicate that there are 1,347 cases left on the docket of the land commission undisposed of. Among these, however, are a number of duplications.

The remaining cases involve lands in the vicinity of the cities of Panama and Colon, and their adjustment will require a larger sum of money in the aggregate than that which has been expended heretofore in the payment of land claims in private settlement and the commission awards.

Judge L. M. Kagy, one of the American commissioners, left for the United States on vacation on June 24, 1915, and in consequence the commission is again inactive.

No executive or administrative officer of our Government is authorized at present to issue leases for Government lands in the Canal Zone, but a number of licenses, revocable at will, which provide that no compensation shall be paid to the lessees for improvements in case the license is terminated, have been issued to steamship companies at Cristobal for lots on which to build steamship offices and residences for the companies' agents. Licenses have been issued also to various companies for land on which to erect oil tanks for storing fuel oil at Cristobal and Balboa, to be sold to passing ships. The Masonic order also acquired a lot at Ancon under license on which a temple has been erected. All of these licensees are required to pay a reasonable ground rent.

The various religious denominations and benevolent associations in the Canal Zone have also obtained land under licenses for the purposes of their respective organizations. These licenses have been issued for a nominal rental only.

The Panama Railroad Company owns the usufruct in the island of Manzanillo, on which the city of Colon is built, except 4 hectares, or about 10 acres of land, which were reserved for the erection of public buildings by the Colombian Government in the latter's concession to the railroad company.

The Panaman Government has divided the reserved area into lots and is leasing them to private individuals. Very little of the reserved area is used by Panama for public purposes. Most of the Government and municipal buildings in the city of Colon are built on railroad lots which the Panaman authorities obtained from the railroad under leases for nominal rentals. The usufructuary title of the railroad company will last throughout the life of the company's concession from Colombia, that is to say, until 1966, at which time the proprietorship in the island, in so far as the title to the land is concerned, will pass to the United States by virtue of the canal treaty, which grants to our Government all of the reversionary rights and interests of the Colombian Government, now Panama, in the properties acquired by the railroad under its concession.

The Panama Railroad Company also owns considerable areas of land in the city of Panama, in addition to that used as a railroad yard and other purposes of the company. The railroad lands in the city of Panama were acquired by the company by private purchases in the main.

The Panama Railroad had 1,382 leases and licenses outstanding and in effect on July 1, 1915, yielding an annual rental to the company of $120,846.78, if all the rentals were collected. The properties covered by the leases and licenses are situated in the cities of Panama and Colon, except some 72 lots at Folks River and a few at Mount Hope and at one or two other places in the Canal Zone. The 72 leases at Folks River have been continued because the lots are situated on the island of Manzanillo, contiguous to the city of Colon. These lots, although in the Canal Zone, might for convenience be treated as part of the city of Colon, especially as they are occupied by laborers and others employed by the canal and the railroad.

On April 30, 1915, a most disastrous fire occurred in the city of Colon, in which 259 houses were burned, valued on the tax records of the Panaman Government in Colon at $1,386,000. The burned area covered about 22 blocks, bounded as follows: On the north by Seventh Street, on the east by D Street, on the south by Fourteenth Street, on the west by Bolivar Street from Fourteenth to Eleventh Streets, and by Front Street from Eleventh to Seventh Streets.

The Panama Railroad Company had leased in the burned area 122 lots to various parties and the Panaman Government leased 92 lots in the same area to private parties. All of the leases from the Panama Railroad contain a provision forbidding the use of the leased property for gambling houses or immoral purposes. As a result of this provision in the leases the "red-light" population was confined to the lots in the burned area owned by the Panaman Government, which had designated that section for a "red-light" district.

The land agent estimates the total loss in houses, merchandise, and household goods, including the damage to the new Masonic Temple, the Colon passenger station, and the concrete building at the corner of Eleventh and Front Streets, which are owned by the Panama Railroad Company, at about $3,000,000.

CIVIL CASES AFFECTING THE PANAMA CANAL AND THE PANAMA RAILROAD COMPANY.

A suit was instituted by Gideon Dixon et al. against George W. Goethals et al. in the district court at Cristobal, seeking to enjoin the Governor of The Panama Canal, the chief of police, the land agent, the Panama Railroad Company, and the local agent of an oil company from taking possession of certain lands at Mount Hope under the President's order of December 5, 1912. The court declined to issue the injunction and the plaintiffs appealed to the circuit court of appeals at New Orleans.

Samuel Anderson et al. instituted a suit against the same defendants named in the Dixon suit. Anderson also sought an injunction on grounds similar to those set out in the Dixon suit. The two cases were consolidated, and the order denying the injunction applied to both of them, and a joint appeal was taken by the plaintiffs in the two cases.

The appellants obtained a temporary restraining order against the Governor and other defendants from the court at New Orleans. The cases were set down by the appellate court for a trial at an early date, and upon a hearing the appeal was dismissed, because it had not been properly taken. The appellant court announced, however, that had the cases been properly brought before the court the action of the trial judge would not have been disturbed. The temporary restraining order was vacated.

The defeated parties did not allow the cases to rest with the decision of the New Orleans court, but have gone to the Supreme Court of the United States on appeal, and endeavored to obtain a temporary restraining order from that high court. The Supreme Court declined to issue the order against the defendants pending a hearing of the cases. The effect of that ruling is to dispose of them for all practical purposes. It can only mean that the Supreme Court is of the opinion that there is no merit in the appeal. The Panama Canal was represented in the trial of these cases on the Canal Zone, as well as in the court at New Orleans, by Mr. William K. Jackson, who was then district attorney of the Canal Zone. The special attorney assisted the district attorney as counsel in preparing briefs in the case.

After the decision was made in the two cases above mentioned, another attempt to enjoin the Governor and other canal officials was made in the case of P. N. Bressie et al., but the court at Cristobal denied the injunction in this case also.

PANAMA RAILROAD COMPANY CASES SETTLED DURING THE FISCAL YEAR 1914–15.

The following statement shows the number of damage suits instituted in the district court of the Canal Zone against the Panama Railroad Company, which were disposed of or settled during the last fiscal year.

1. CRISTOBAL DIVISION.

Adras Monpoint, Administrator of Estate of Joseph John, deceased, *v.* Panama Railroad. Claim for $10,000 damages for personal injuries. Complaint filed February 19, 1914; answer filed March 5, 1914; nonsuit entered without prejudice on motion of plaintiff, July 15, 1914.

Samuel Anderson *v.* Panama Railroad. Claim for $5,000 damages for personal injuries. Complaint filed March 12, 1914; answer filed May 25, 1914; case dismissed on motion of plaintiff January 18, 1915, after receiving $1,000 in full settlement of claim.

Ella Laport, Administratrix of the estate of Albert Laport, deceased, *v.* Panama Railroad. Claim for $10,000 damages for personal injuries resulting in death, Complaint filed October 12, 1914; answer filed November 2, 1914; amended answer filed February 5, 1915; judgment for plaintiff in the sum of $950 and costs April 17, 1915.

Isaac Greenidge *v.* Panama Railroad. Claim for $7,500 damages for personal injuries. Complaint filed August 25, 1914; demurrer filed September 21, 1914; defendant's demurrer sustained and case dismissed February 13, 1915.

Maria J. Arpon *v.* Panama Railroad Company. Claim for $500 damages for loss of trunk. Complaint filed June 20, 1914; defendant entered into appearance June 25, 1914; $100 accepted in full settlement by plaintiff.

Vita Voza, alias Victor Bossa, alias Victor Hermosa, deceased, by Administrator Guiseppe Voza *v.* Panama Railroad Company. Claim for $20,000 damages for personal injuries resulting in death. Complaint filed May 26, 1914; plea of statute of limitations as bar to suit filed by defendant June 22, 1914; plea of defendant sustained July 15, 1914; case dismissed January 18, 1915.

2. BALBOA DIVISION.

George Joseph *v.* Panama Railroad Company. Claim for $7,500 damages for personal injuries. Complaint filed June 15, 1914; answer filed July 23, 1914; plaintiff's motion to dismiss granted September 15, 1914.

The following Panama Railroad cases, in some of which the Railroad Company is plaintiff and in others it is defendant, were pending in the district court of the Canal Zone at the beginning of the fiscal year 1915–16:

1. CRISTOBAL DIVISION.

Panama Railroad Company *v.* Eufracia C. de Villalobos and Porfirio Melendez. Suit for revindication of lands. Petition filed March 21, 1912; defendants' answer filed July 1, 1912, and September 12, 1912; amended answer filed August 10, 1914; C. P. Fairman made a motion to be allowed to intervene personally August 14, 1914.

Fenne Coverley *v.* Panama Railroad. Suit for $10,000 damages for personal injuries. Complaint filed January 14, 1915; defendant's appearance entered January 23, 1915; set for trial in division of Balboa April 10, 1915; not tried; no appearance by plaintiff.

James Daley *v.* Panama Railroad. Action on debt, $440.90. Complaint filed January 30, 1915; answer filed May 27, 1915; case continued subject to call June 23, 1915.

Pedro Celestino Cerezo *v.* Eusebio Diaz et al., and Panama Railroad Company et al, as intervenors. Petition to establish title to real property. Petition filed June 24, 1909; appearance of Panama Railroad filed August 5, 1909; special appearance of Panama Railroad filed February 12, 1910; Panama Railroad answer filed July 7, 1910; case continued subject to call, May 7, 1911.

Panama Railroad Company *v.* A. S. Mendes et al. Suit for revindication of lands. Petition filed March 6, 1912; answer filed May 16, 1912.

2. BALBOA DIVISION.

Wm. L. Davis *v.* Panama Railroad Company. Damage suit, $500 for malicious arrest. Complaint filed December 9, 1914; answer filed January 18, 1915. Case continued subject to call on February 11, 1915.

Suit was instituted by the Panama Railroad Company against Rodriguez and Uribe in the courts of the Republic of Panama, to prevent the defendants from interfering with the rights of the company along the shore front in the city of Panama at and adjacent to the American pier, which is the property of the railroad company. The case was filed on April 24, 1915.

The second circuit court of the city of Panama rendered a judgment against the railroad company on May 3, 1915. An appeal was taken to the Supreme Court of Panama on May 3, 1915, where a preliminary judgment against the Panama Railroad Company was rendered on May 31, 1915. A motion for reconsideration of the preliminary judgment was denied.

Under the Panamanian laws a trial in the Supreme Court is *de novo*, and counsel for the railroad company is now preparing additional evidence to submit in support of the railroad company's case.

The American pier was built by the railroad company in 1855, and the company's ownership in that pier, as well as others, is recognized in the amended concession to the company granted by the Congress of Colombia in 1867. The Supreme Court of Colombia some years ago, held that the rights of the Panama Railroad Company under the concession need not be proven by public instrument duly recorded in the registrar's office, because those rights were set out affirmatively in an act of Congress, which is not required to be recorded in the registrar's office. Notwithstanding the law upon the subject, as interpreted by the Supreme Court of Colombia, the Supreme Court of Panama based its preliminary judgment against the Panama Railroad Company upon the proposition that the railroad company had not proven its ownership in the American pier by a notarial document duly recorded. I may add that the railroad company's ownership of the pier is of common knowledge and forms part of the history of the Isthmus.

The case has not yet gone to final judgment, and counsel for the railroad company are hopeful that a reversal of the decision of the court will be obtained.

A number of claims for damages against the Panama Railroad were compromised and disposed of without suit during the last fiscal year.

In addition to the activities of this office already mentioned in this report, I may say that the special attorney has acted in an advisory capacity to the Governor and the various department heads in matters relating to canal organization and administration, in affairs between the Canal Zone and the Washington authorities, and in many matters arising between the Canal Zone and the Republic of Panama.

Respectfully,

FRANK FEUILLE, *Special Attorney.*

Maj. Gen. GEO. W. GOETHALS, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

APPENDIX L.

REPORT OF THE DISTRICT ATTORNEY FOR THE CANAL ZONE.

Ancon, Canal Zone, *July 15, 1915.*

Sir: The present district attorney was appointed June 14 and qualified June 19, 1915, the former district attorney, Mr. William K. Jackson, jr., having voluntarily resigned the office, effective upon the qualification of his successor; so that the work of this office during almost the whole of the fiscal year reported upon was under the direction of Mr. Jackson.

The district attorney is required by law "to conduct all business, civil and criminal, for the Government, and to advise the Governor of The Panama Canal on all legal questions touching the operation of the canal and the administration of civil affairs."

It is not practicable to report in detail upon the work of this office for the fiscal year ended, except in the matter of criminal cases, and appended hereto is a statement in detail of all criminal prosecutions in the district court of the Canal Zone. The district court has two divisions, one sitting at Balboa on the Pacific side, and the other at Cristobal, on the Atlantic side, both presided over by the same judge. There are two magistrates' courts, one at Balboa and the other at Cristobal, presided over by different magistrates. The report is made up so as to show the appeals from each magistrate's court and the cases disposed of in each division of the district court.

There was a total of 391 cases disposed of in the district court, 94 of which were appeals from the magistrates' courts. Of the total number disposed of in the district court, 279 resulted in convictions. Of those convicted, the court suspended sentence in 55 cases, 33 of which were felonies and 22 misdemeanors.

All criminal cases brought before the district court during the year have been disposed of, and at the end of the fiscal year, June 30, 1915, not a criminal case was pending in the district court. There was one fugitive from justice from the Dominion of Canada in jail awaiting extradition.

During the year there have been no appeals in criminal cases to the Circuit Court of Appeals of the Fifth Circuit of the United States, which has appellate jurisdiction of all criminal cases wherein the offense charged is punishable as a felony.

Since the close of the fiscal year 1912–1913 there has been a steady falling off of the number of criminal cases in the courts of the Canal Zone, due to the decrease in number of employees of the canal, and the large decrease in population. For the purpose of comparison there is attached a summary of criminal cases for the past three years.

The present district attorney is familiar with the result of jury trials upon the Canal Zone, both before and since the Executive order of July 4, 1913, authorizing jury trials in all felony cases.

Before the Executive order referred to jury trials were allowed only in capital cases. Since the Executive order of July 4, 1913, the only defendants demanding a jury trial have been white citizens of the United States. Negroes and foreigners in the Zone prefer trial by the court without a jury. Since the Executive order referred to, 6 white defendants have demanded jury trials; 1 was charged with violation of the white slave act, 1 with murder, 1 with manslaughter, and 3 with assault with a deadly weapon. All were acquitted by juries. The four last cases referred to were for crimes committed against negroes, and juries refuse to convict white defendants in these cases.

The results of jury trial since the Executive order of July 4, 1913, have been very unsatisfactory, and I renew the recommendation made in the last annual report that the law be amended so that there may be a return to the former practice of allowing jury trials in capital cases only.

There are a number of port and harbor regulations and regulations relating to sanitation, quarantine, etc., which must be observed by vessels and masters of vessels using the canal, the violation of any of which is a misdemeanor, and under existing laws and Executive orders they are triable and punishable only in the district court, after being bound over by the magistrate's court.

The courts and their officers make every effort to facilitate and speed the trial of these cases, but there are unavoidable delays; a warrant must be taken out, the master arrested, counsel employed, and in some cases the master and the witnesses brought across the Isthmus for trial, and the expenses of the delay and of the trial are out of proportion to the gravity of the offense. I recommend that our laws and Executive orders be amended so that all misdemeanors committed by vessels and masters of vessels using the canal which are punishable by fine and which are not in violation of and punishable under any act of Congress, may be summarily heard and determined by the captains of the ports of Cristobal and Balboa, and that the fines provided by law shall be imposed and collected by them and accounted for as are fines imposed by the courts.

Respectfully,

Charles R. Williams,
District Attorney.

Maj. Gen. George W. Goethals, United States Army,
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

EXHIBIT 1.—*Criminal prosecutions, 1914–15.*

Offense.	Number.	Offense.	Number.
Adultery	4	Gambling	27
Assault and battery	2	Grand larceny	87
Assault with deadly weapon	22	Grand larceny, attempt to commit	1
Assault with intent to commit murder	1	Immigration laws, violation	2
Assault with intent to commit felonies other than murder	1	Infamous crime against nature	2
Attempt to defraud	2	Intoxication	1
Attempt to kill by poison	1	Liquor regulations, violation	7
Automobile regulations, violation of	1	Loitering	17
Battery	5	Malicious mischief	2
Buying Government property from a soldier	2	Manslaughter	3
Bringing stolen goods into Canal Zone	5	Murder	3
Burglary	39	Navigation rules, violation	3
Carrying concealed weapons	5	Nonsupport	2
Coach tariff regulations, violation	4	Opium act, violation	9
Conspiracy	5	Obtaining money under false pretenses	3
Cruelty to animals	2	Perjury	1
Defrauding	1	Petit larceny	11
Deportation, returning to Canal Zone	7	Quarantine regulations, violation	10
Deserter	1	Rape	2
Disorderly conduct	22	Rape, attempt to commit	2
Disturbing the peace	1	Receiving stolen property	2
Embezzlement	20	Resisting an officer	1
Extortion	1	Robbery	5
Falsifying evidence	1	Sanitary regulations, violation	1
False personation	4	Speed regulations, violation	1
Forgery	9	Vagrancy	10
Fraud	5	White slave act, violation	1
Fugitive from justice	2	Total	391

There was one application for a writ of habeas corpus, which was denied.

EXHIBIT 2.—*Disposition of criminal cases, 1914–15.*

	Balboa.	Cristobal.	Total.		Balboa.	Cristobal.	Total.
Guilty	184	95	279	Fugitive	1	2	3
Not guilty	52	31	83	To insane asylum	1	2	3
Nolle pros	8	9	17	Dismissed	....	2	2
Extradited to United States	1	1	2	Total	249	142	391
Transferred to United States	2	....	2				

EXHIBIT 3.—*Appealed cases from magistrates' courts.*

	Balboa.	Cristobal.	Total.		Balboa.	Cristobal.	Total.
Guilty	48	17	65	Nolle pros	....	3	3
Not guilty	15	6	21	Total	66	28	94
Withdrawn	3	1	4				
Dismissed	....	1	1				

EXHIBIT 4.—*Summary of criminal prosecutions for the fiscal years, 1913–1915.*

	1912–13	1913–14	1914–15
Adultery	18	8	4
Arson	1	....	....
Assault and battery	51	6	2
Assault with deadly weapon	27	29	22
Assault with intent to commit murder	4	2	1
Assault with intent to commit felonies other than murder	5	9	1
Attempt to defraud	....	9	2
Battery	....	9	5
Burglary	53	27	39
Deportation, returning to Canal Zone	13	7	7
Disorderly conduct	27	22	22
Embezzlement	24	10	20
False personation	3	10	4
Forgery	24	20	9
Fraud	5	3	5
Gambling	100	56	27
Grand Larceny	124	123	87
Incest	2	....	....
Liquor regulations, violation of	9	6	7
Loitering	....	12	17
Manslaughter	5	3	3
Manslaughter, involuntary	....	1	....
Mayhem	1	....	....
Murder	2	....	3
Murder, second degree	1	....	....
Navigation rules, violation	19	8	3
Perjury	1	2	1
Petit larceny	27	18	11
Rape	3	2	2
Receiving stolen property	2	....	2
Resisting an officer	....	....	1
Rioting	8	....	....
Sanitary regulations, violation of	....	4	1
White slave act, violation of	....	....	1
Miscellaneous	62	62	82
Total	621	468	391

APPENDIX M.

REPORT OF THE GENERAL PURCHASING OFFICER AND CHIEF OF THE WASHINGTON OFFICE.

THE PANAMA CANAL,
Washington, D. C., July 7, 1915.

SIR: I have the honor to submit the following report on the work of this office during the fiscal year ended June 30, 1915:

The general organization of all branches of the office has remained as described in my report of July 20, 1914. Certain individual changes among the senior officials have been made, as follows:

Mr. C. E. Dole, who was chief clerk in the purchasing department from October 9, 1905, resigned on April 9, 1915, to enable him to accept a position as purchasing agent for the Alaskan Engineering Commission. Mr. A. L. Flint, formerly assistant to the chief of the Washington office, was promoted to the vacancy created by Mr. Dole, the vacancy as assistant to the chief of office being filled by the promotion of Mr. Ray L. Smith, formerly the chief of the appointment division of the Washington office. Mr. F. B. Clark, who was, next to the chief clerk, the senior clerk in the purchasing department and who has been with The Panama Canal since January 20, 1905, resigned May 17, 1915, in order to enable him to accept a position in connection with a proposed purchasing office to be established by the Reclamation Service in Denver, Colo. Mr. B. F. Harrah has been relieved from duty as assistant auditor for The Panama Canal and has been assigned to duty as special counsel and examiner of claims, his position as assistant auditor having been filled by the promotion of Mr. A. L. Webb.

The following divisions are now under my charge as general purchasing officer and chief of the Washington office of The Panama Canal: General office, including the appointment division and correspondence and record division; office of the assistant auditor; and the purchasing department.

There has been a decrease in the number of appointments as compared with the previous year. During the year covered by this report, 899 persons within the United States were tendered employment for duty on the Isthmus in grades above that of laborer; 652 accepted and were appointed, covering 59 different positions. Three thousand four hundred and eighty-four persons, including new appointees, those returning from leave of absence, members of employees' families, and employees of contractors and their families, were provided with transportation from the United States to the Isthmus; and in response to inquiries and applications for employment during this period, and in the issuance of appointments, 16,054 letters were written, 1,888 telegrams sent, and 17,519 circulars mailed.

The work of the correspondence and record division, comprising all general or administrative correspondence and miscellaneous matters, has continued heavy throughout the year, due partly to questions arising in connection with the opening of the canal.

The following statements show the work of the office of the assistant auditor of The Panama Canal for the fiscal year ending June 30, 1915:

CLAIM STATEMENT.

On hand July 1, 1914	732
Received from July 1, 1914, to June 30, 1915	16,132
To be accounted for	16,864
Passed for payment from July 1, 1914, to June 30, 1915	16,663
On hand June 30, 1915	201

FINANCIAL STATEMENT OF RECEIPTS AND DISBURSEMENTS.

Disbursing clerk's balance July 1, 1914		$82,173.01
Receipts:		
From United States Treasury	$13,505,000.00	
Miscellaneous collections	236,950.50	
		13,741,950.50
To be accounted for		13,824,123.51
Disbursements:		
Vouchered expenditures	12,498,500.42	
Repayments to appropriations	669,594.83	
Refundments on collections	1,670.46	
Income tax deposited	154.17	
Collections deposited to appropriations and miscellaneous receipts	163,700.99	
		13,333,620.87
		490,502.64
Disbursing clerk's balances June 30, 1915:		
General account as disbursing clerk	416,268.74	
Special deposit account	74,233.90	
		490,502.64

During the fiscal year 13,472 vouchers for payment, amounting to $12,498,500.42, and 1,106 settlements by transfer of appropriation, aggregating about $448,000, were given an administrative examination.

PURCHASING DEPARTMENT.

The purchasing department has been continued as heretofore organized under the supervision of the Chief of Engineers, United States Army, and in direct charge of an officer of the Corps of Engineers as general purchasing officer, with headquarters at Washington, D. C. The principal purchases are made from the Washington office, with assistant purchasing agents located at New York, New Orleans, and San Francisco, these latter offices being also used for receiving and shipping of such materials as are purchased for forwarding to the Isthmus through their respective ports. A small force of employees is maintained in the medical supply depot, United States Army, New York, N. Y., in which office the purchases of medical and hospital supplies are made under the officer in charge of the depot.

The same general system of purchasing through circular invitations to bid prevails as described in previous annual reports. These circulars, in addition to being sent direct to regular bidders, are advertised in newspapers and distributed through the offices of the assistant purchasing agents and the field officers of the Corps of Engineers, United States Army, located throughout the United States, through which sources of information, in connection with newspaper advertising, manufacturers and dealers throughout the country may obtain the circulars and such specifications and other necessary data as will enable them to submit proposals and make deliveries through the nearest ports. The system of annual contracts has been continued, but has been reduced to such staple articles as will be used after the completion of the canal.

In order that there shall be no surplus of material on the Isthmus, it has been the practice recently to purchase in small quantities and only for immediate needs. The result of this practice has been a large increase in the number of orders, the average value of each order, however, being considerably reduced below the average of former years.

A corps of inspectors under the direction of the inspecting engineer located in Washington is maintained, and all materials purchased are passed on before shipment to the Isthmus. Assistance in inspection has also been rendered by the field officers of the Corps of Engineers. Practically all of the independent inspection forces which were necessary and located at points outside of Washington, for the past four or five years, have been eliminated or greatly reduced as the work on the lock gates and electrical machinery has been practically completed. The work of inspection has been greatly facilitated by assistance rendered The Panama Canal by the Bureau of Standards, the Bureau of Mines, the Bureau of Chemistry, and the Medical Department, the Ordnance Department, and the Quartermaster Corps of the United States Army.

The reports from this office have never given a very complete or comprehensive statement relative to the duties and methods of the purchasing department, and it is thought that such a report might be of considerable interest to those interested in Government purchases.

The purchasing office in Washington consists of two main divisions, the purchasing department proper and the inspecting department.

Under the purchasing department proper certain subdivisions have been made for convenience of the work; these divisions and the special duties of each will become apparent in the following general statement.

In order to give a comprehensive idea of the methods of the office, the simplest manner is to follow through the office the various operations in connection with the requisitions for materials as they are received from the Isthmus, these requisitions being the basis of the orders placed in the Washington office.

Requisitions for materials from the various divisions on the canal are prepared in these various divisions and forwarded to the chief quartermaster, where they are filled as nearly as they can be from stock on hand. The balance of the material called for is then consolidated on requisition forms which, after receiving the approval of the Governor, are forwarded to the purchasing department in Washington. These requisitions are in general accompanied by special specifications where such specifications are necessary, as, for example, in the case of the lock gates, emergency dams, etc. Where special specifications are not necessary, the standard specifications of The Panama Canal for any particular material is used. If there is no standard specification, the requisition generally bears a reference to a former Washington order for similar material which was satisfactory.

On the receipt of the requisitions they are separated, and each particular item is marked by the general purchasing officer so as to indicate just how it shall be handled. If, for example, the item is a large one and there is no indication of its being urgently needed, it is referred to the clerk in charge of the circular and advertisement desk for including in a printed circular which, wherever practicable, is advertised for 30 days before opening. If the article asked for in the requisition is urgently needed and the estimated cost warrants, the item is referred to the clerk in charge of open-market orders with instructions to send out circular letter to several firms who are known to be able to furnish satisfactory material in order to obtain as much competition as practicable. If the item requisitioned for is a proprietary material, or if the estimated cost is not great, or if there is an indication that there is great urgency for the material, the item is referred to the clerk in charge of the open-market desk with instructions to purchase it from the particular firm mentioned, or from the firm which furnished satisfactory material under a former order, these urgent matters being generally handled by telegram.

After the item to be purchased has been included in a printed circular, in a circular letter, or in a request for quotations sent to one firm only, the further method of handling is practically the same under each case.

On the date and time set for the opening all bids received are opened in public, prices are abstracted, and the abstract, with bids, is then presented to the general purchasing officer for award, any information relative to the material, etc., which may be of value to him in making this award having been, as far as practicable, gathered by the clerk beforehand.

In handling awards, unless the specifications for the particular item indicate clearly that award will be made on the basis of a sample or on the basis of the specifications submitted by the bidder as may be to the best interests of the Government the award is made strictly on the specifications as issued by The Panama Canal. The bid of the low bidder as shown by the abstract is examined, and if his bid is strictly in accordance with the requirements of the circular or circular letter award is made to that bidder without further investigation, provided, of course, that the price quoted is considered reasonable in view of existing market conditions and in view of former purchases of similar material.

In other words, it is assumed that the specifications as issued by The Panama Canal cover the particular material desired and except in a very few instances The Panama Canal would not be warranted in passing over a satisfactory bid based strictly on these specifications in favor of a higher bid, even though this higher bid might cover a material which would be of longer life or better than the material specified by The Panama Canal.

When an award is made an order is placed on the successful bidder, using a form prepared for this purpose, the order being based on the bid and on the circular and specifications under which the bid was submitted. This order gives certain reference marks which must be placed on the packages when the material is shipped, these reference marks including an order number, a different number being used for each order issued, and also including the number of the requisition on which the material was originally called for from the Isthmus. The order also specifies the date on which the delivery shall be made, which date is usually indicated by the bidder in his original bid, and each order generally includes a clause for liquidated damage in case the material is not delivered on the date specified, this liquidated-damage provision being included in all printed circulars.

When the order is written a number of carbon copies are made and are distributed to the various offices interested. The face copy of the order, which goes to the contractor, is first water copied, in order that the office shall have an exact record of the order as it was mailed to the contractor, this order being accompanied by a printed form indicating how shipment shall be made and what papers shall be forwarded and to whom. An additional form is also inclosed which is prepared for the signature of the contractor and which he is supposed to mail at once to the inspecting engineer, advising that official when the material will be ready for inspection and where this inspection should be made.

A carbon copy of the order is sent to the office of the inspecting engineer, where it is immediately examined by the inspecting engineer or one of his assistants to see that all information necessary for inspecting the items included in the order is on hand. If this investigation indicates that there are any uncertainties in either the requisition, specifications accompanying the same, or in the order, these uncertainties are immediately investigated and straightened out. The necessary papers for handling the inspection are then attached to the copy of the order and are ready for forwarding to the proper inspector as soon as the notice relative to the place and time of inspection is received from the contractor.

The inspector, on receipt of the papers covering the particular material, gets in touch with the contractor and arranges to make the inspection on the day specified or on such other day as may be determined. In handling the inspections care is taken to see that all the requirements of the specifications are complied with. In case of castings or other materials which are required to be in accordance with drawings the necessary measurements are taken by the inspector, and where certain material is specified the inspector either makes the physical test at the works, if there is a satisfactory testing machine, or sends them with the proper letter of transmittal to the inspecting engineer, who arranges to have the physical tests made at the Bureau of Standards, in Washington.

Where the specifications require it, the inspector takes drillings from the castings or other pieces and forwards these drillings to the inspecting engineer in Washington, who, as in the case of the physical-test pieces, forwards them to the Bureau of Standards, where a complete chemical analysis is made. In addition to using the laboratory at the Bureau of Standards, The Panama Canal has established a chemical laboratory in Pittsburgh, where most of the analyses of iron and steel are made.

After handling the inspection of any material the inspector fills out a complete form giving all the data required and forwards this form to the inspecting engineer in Washington. If there is no doubt as to the material meeting the requirements, and if it is not necessary to hold the material for the results of the chemical tests, the inspector immediately hands to the contractor on the completion of his inspection a form properly filled out indicating that the material has been inspected and is passed for shipment. This form is known as the shipping authority, and one copy is forwarded to the inspecting engineer, which another copy is forwarded to the particular office of The Panama Canal through which the material will have to pass. For example, if the material in question is a forging which has to be sent to the machine shop for machining, the copy of the shipping authority referred to is forwarded to the inspector who will handle the machine work, and he is then in position to know that the forging when received has been properly passed. It is hardly necessary to state that each item when it is passed is marked by the inspector with a certain stamp and is also marked with his own individual inspection number.

If the inspection indicates variations from the specifications, or if it is necessary to wait for the result of tests, the inspector so instructs the contractor and does not give him the shipping authority until after receipt of advice from the inspecting engineer that the physical and chemical tests are satisfactory and that the variations from the specifications in other respects, if there are any, may be waived. In this way uniformity of inspection is assured, as an inspector is not permitted to use his own judgment in connection with variations, such variations being authorized from the main office in Washington. If, in the opinion of the Washington office, these variations are material, the item in question is rejected and the contractor and inspector and all others concerned are so notified.

Complaints have been made to this office frequently that the cost of inspection is often excessive, as compared with the cost of the material which is being inspected. However, in the past it was the custom to permit items of small cost to be forwarded to the Isthmus without inspection, and it was found in several cases that the injury to the Government on account of the delay in having to get additional material so far outweighed the cost of the particular item that the practice of inspecting all items, irrespective of cost, was instituted.

When the order is prepared, a copy is forwarded to the shipping clerk, where it is examined as to its urgency, time of delivery, etc. The shipping clerk also handles what is known as the "punching desk," and it is his duty to see that material called for in the various orders is promptly submitted for inspection, and if there is any delay, to urge the contractor to expedite delivery. When a copy of the order is received a notation is made in a diary kept for the purpose at some advanced date, this notation being an indication to look up the status of the order on that advanced date. For example, if material is urgently needed this date would probably be about five days after the issuance of the order. When that day arrives, all the orders noted in the diary for that particular date are called for and examined. If there is nothing on the file to indicate that any action has been taken looking toward handling the inspection, a letter is written to the contractor inviting his attention to the order and asking for prompt advice as to date of inspection. As soon as this letter is written a notation is made on a further advanced date in the diary, and on this date the former action is repeated.

The time permitted to elapse before the first punching depends very largely on the nature of the order and in some cases the date may be considerably in advance, whereas in other cases the first punching date is, as indicated above, within a few days of the issuance of the order.

As material is shipped by a contractor, copies of the shipping papers are forwarded to the Washington office and record of shipments is kept by the shipping clerk. The authorities on the Isthmus, in case of urgent orders, are also notified by cablegram when the material covered by these orders leaves the seaboard.

Several checks are made in order to see that material ordered is in accordance with requirements. Whenever a request is issued, in any form, for quotation on any material, two copies of this request are forwarded to the chief quartermaster, who in turn is supposed to forward one copy of the request to the particular official on the Isthmus who made the original requisition. This official is supposed to immediately compare this request with his original requisition, and if there is any discrepancy the attention of the Washington office can be called to same promptly by cable.

Likewise, when the order for the material is issued, two copies are forwarded to the chief quartermaster and are compared by the requisitioning officer, as indicated above. As a third check, the inspecting engineer compares the order with the requisition to see whether specifications, etc., are fully covered. Owing to the various checks made, errors are very infrequent.

It has been found in this office that the use of forms is very desirable and facilitates very materially the handling of work. At times the number of live orders on hand amount to approximately 1,000, and it can be readily understood that it is absolutely impossible to give personal attention to each particular order. In other words, matters must be handled, as much as possible, in a routine manner. If a clerk or an inspector has before him a form to be made out, there is very little excuse for his omitting in that form any of the information called for, each item of information being required in connection with the handling of the inspection or the final settlement of the order. If each clerk or each inspector were left to make his report without a form, it can readily be seen that confusion would soon result and it would be practically impossible to settle questions which might arise in the future.

Frequent requests have been made to permit reports to be made in a manner different from that required by our forms, and it is probable that those handling inspections for The Panama Canal have frequently felt that the officials in Washington were extremely dictatorial in not permitting any variation from our usual method. It is thought that a perusal of the above paragraphs will indicate the reasons why these variations can not be permitted.

Tables are inserted below indicating the total amount of orders placed by the Washington office during certain periods, and also indicating the number of orders which have been placed each month during these periods. At first glance it might seem that the work of the office depended on the total value of the orders rather than the total number, but when it is considered that each order must go through the same routine it will be appreciated that the criterion of the amount of clerical work in the Washington office, not only in the purchasing department, but in the accounting department also, depends almost directly on the number of orders placed. It may be a surprise to note that, based on this rule, the work of the Washington office since the beginning of the period indicated in the tables was at a maximum in April of this year.

Summary of purchases through the Washington office of The Panama Canal to July 1, 1915.

	1904-5	1905-6	1906-7	1907-8	1908-9	1909-10
July		$374,025.27	$539,187.64	$570,506.17	$747,081.79	$1,069,918.66
August		561,202.85	349,439.38	919,398.34	1,452,312.74	765,518.23
September		1,751,395.96	1,166,161.14	1,241,190.74	353,099.74	823,114.77
October		1,423,222.12	898,689.01	933,470.00	400,042.76	549,825.27
November		185,672.00	541,792.29	1,008,983.06	6,798,792.51	388,789.00
December		531,278.31	317,279.00	565,722.01	1,670,059.03	443,709.14
January		133,904.75	991,497.61	571,050.18	942,343.92	314,102.60
February		232,762.45	717,212.96	1,029,738.32	599,173.71	913,545.20
March		311,848.77	855,454.14	478,407.32	221,660.79	759,446.42
April		207,320.17	653,627.80	547,056.57	521,035.54	1,044,599.27
May		299,913.23	922,878.43	351,886.69	1,001,318.86	527,175.58
June		2,385,145.57	566,215.71	832,168.32	1,649,786.44	7,849,982.11
Total[1]	$3,453,101.00	8,397,691.45	8,519,435.11	9,049,577.72	16,356,707.83	15,449,717.25

	1910-11	1911-12	1912-13	1913-14	1914-15	Total.
July	$303,268.55	$433,670.97	$654,471.72	$517,771.88	$718,966.39	$5,928,869.04
August	877,450.74	630,672.30	394,437.01	3,101,429.43	337,738.76	9,389,599.78
September	591,144.03	1,358,010.33	1,767,851.97	956,766.57	567,620.78	10,576,356.03
October	235,448.63	793,025.16	1,183,840.43	541,043.79	365,884.81	7,324,491.98
November	327,028.95	535,844.91	688,976.32	553,051.63	333,445.15	11,362,366.82
December	239,860.39	1,574,524.97	523,891.97	465,258.35	452,543.87	6,784,127.04
January	389,604.53	584,696.99	1,053,796.84	539,602.35	1,356,774.96	6,877,374.73
February	199,130.61	1,344,109.01	533,067.70	560,222.25	599,964.50	6,728,926.71
March	332,946.65	578,734.91	1,015,329.91	820,002.38	368,784.10	5,742,615.39
April	115,982.90	673,549.99	1,861,748.15	2,580,052.83	685,022.94	8,889,996.16
May	2,854,223.75	1,134,964.48	1,326,939.40	1,026,491,66	873,275.47	10,319,067.55
June	345,550.50	436,810.18	988,376.91	585,540.28	647,667.61	16,287,243.63
Total	6,811,640.23	10,078,614.20	11,992,728.33	12,247,233.40	7,307,689.34	109,664,135.86

[1] Total value of order to June 30, 1905.

Summary of orders placed through the Washington office of The Panama Canal to July 1, 1915.

	1904	1904-5	1905-6	1906-7	1907-8	1908-9	1909-10
July		75	241	446	285	320	514
August		63	195	334	335	470	484
September		120	218	343	251	422	491
October		137	213	340	408	498	389
November		92	184	208	284	432	470
December		53	172	331	332	349	470
January		174	172	314	319	547	433
February		165	142	267	461	459	417
March		128	292	390	518	367	603
April		82	185	359	410	611	479
May		202	202	425	448	422	428
June	8	294	347	430	472	561	587
Total	8	1,585	2,563	4,187	4,523	5,458	5,765

Summary of orders placed through the Washington office of The Panama Canal to July 1, 1915.—Continued.

	1910–11	1911–12	1912–13	1913–14	1914–15	Total.
July	361	306	552	534	656	4,290
August	398	401	535	544	563	4,322
September	446	451	522	577	595	4,436
October	440	610	653	564	699	4,951
November	415	479	553	673	553	4,343
December	410	545	524	661	636	4,483
January	373	542	632	697	686	4,889
February	265	542	577	672	629	4,596
March	290	495	561	727	686	5,057
April	277	592	646	694	838	5,173
May	306	577	718	555	757	5,040
June	382	420	614	528	768	5,411
Total	4,363	5,960	7,087	7,426	8,066	56,991

An examination of the above tables indicates that the number of orders fell off considerably during the period 1910–1911. As this period was the period of the greatest amount of work on the Isthmus, the question naturally arises as to the reason for the decrease. This is readily explained, however, by the fact that during this period a great many purchases were made under what is known as the annual-contract system, and also that the purchases were made in large quantities.

The routine in the branch offices in New York, New Orleans, and San Francisco is practically the same as above described, but no record is given of the number of orders placed nor of the amounts of these orders.

The principal items of equipment purchased during the past year are as follows: Valves for dry dock at Balboa, $49,100; pumping plant for Balboa dry dock, $133,056; granite for dry dock, $22,895.20; six sets of spare regulating valves for locks, $41,100; one 15-yard dipper dredge (of improved design over former dredges), $377,500; and three 1,000-yard steel dump scows, $187,980. Shipments of cement were continued during the fiscal year under the contracts entered into January 7, 1909, and September 13, 1912, amounting to 556,777 barrels and making a total of 6,807,237 barrels delivered under these contracts.

Very respectfully,

F. C. Boggs,
Major, Corps of Engineers, United States Army,
General Purchasing Officer, Chief of Office.

Maj. Gen. Geo. W. Goethals, *United States Army,*
Governor, The Panama Canal,
Balboa Heights, Canal Zone.

Appendix N.

TABLES SHOWING INCREASES IN SALARIES AUTHORIZED OVER ORGANIZATION OF JULY 1, 1913, AND INCREASES OF NUMBERS OF PERSONS EMPLOYED OVER NUMBER ALLOWED IN 1915 BOOK OF ESTIMATES, AS REQUIRED BY ACT OF CONGRESS APPROVED AUGUST 1, 1914.

DEPARTMENT OF OPERATION AND MAINTENANCE.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
DREDGING DIVISION.					
Engineers, $2,100			8	23	18 in approved organization July 1, 1914; increase 1 for maintenance and care of pumps and machinery of seagoing suction dredge Culebra while temporarily retired from service; increase 1 for maintenance and care of pumps and machinery of seagoing suction dredge Caribbean while retired pending sale; increase 3 for relief work, dipper dredge service, account Sunday watches.
Engineers, $1,860			36	44	41 in approved organization July 1, 1914; increase 1 for U. S. Grader No. 1; increase 2 for relief work, dipper dredge service.
Engineers (steam), $1,800.			1	4	1 in approved organization July 1, 1914; increase 2 account transfer Gamboa sand and gravel handling plant from Panama Railroad to dredging division; increase 1 for work on Obispo diversion channels.
Engineers, $1,740			1	9	8 in approved organization July 1, 1914; increase 1 for relief work on pipe-line suction dredges.
Engineer	$1,860.00	$2,040.00			To provide sufficient number of relief engineers, towboats, account necessity working three shifts in Gaillard Cut service.
Engineers	1,800.00	2,040.00			3 increased account placing all gold organization positions on nonsubsisting basis.
Foremen, $1,800			5	8	7 in approved organization July 1, 1914; increase 1 for work on Obispo diversion channels and draining hydraulic fills vicinity Panama.
Foreman machinist, $1,800.				1	Account transfer Gamboa sand and gravel handling plant from Panama Railroad to dredging division.
Foremen	1,800.00	2,040.00			2 increased account placing all gold organization positions on nonsubsisting basis.
Foreman, $1,440				1	Pipe-line suction dredge, for relief of men on vacation.
Inspectors, $1,200				3	Account slide inspection work, Gaillard Cut.
Levelmen, $1,500			4	7	6 in approved organization July 1, 1914; increase 1 for survey work in connection with Obispo diversion channels.
Masters, $2,700			2	3	2 in approved organization July 1, 1914; increase 1 for relief work account dredging operations Gaillard Cut Sundays and holidays.

Tables showing increases in salaries authorized over organization of July 1, 1913—Contd.

DEPARTMENT OF OPERATION AND MAINTENANCE—Continued.

	Increase in pay.		Increase in numbers.		
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	Explanation.
Dredging Division—Continued.					
Master and chief engineer, $2,100.				1	For operation U. S. Grader No. 1.
Mates (craneman), $2,280.				8	6 in approved organization July 1, 1914; increase 2 for relief work, dipper dredge service, account dredging operations Gaillard Cut Sundays and holidays.
Mates	$1,860.00	$2,100.00			3 increased to provide sufficient number of relief mates, towboats, account necessity working three shifts in Gaillard Cut service.
Mates, $1,740				11	8 in approved organization July 1, 1914; increase 1 account vacation relief; increase 2 for operation U. S. Grader No. 1.
Operators, $2,580				9	6 in approved organization July 1, 1914; increase 3 account vacation relief.
Operators, $1,620				10	7 in approved organization July 1, 1914, increase 3 for operation relay pump, East Breakwater.
Mechanical Division.					
Chemist, $1,500				1	Continued from organization of previous year.
Clerks, $1,500			4	5	1 for oil handling plants; Governor's letter of Dec. 26, 1914.
Clerks, $1,800			8	12	Continued from organization of previous year; work of mechanical division did not decrease as anticipated.
Clerks	1,800.00	2,100.00	1	6	1, see last year's report; 1 authorized in organization of July 1, 1914, in charge of dry dock shops office.
Do	1,950.00	2,100.00			1, see last year's report; 1 authorized in organization of July 1, 1914, account of increased duties of chief file clerk and to agree with rating of similar positions in other divisions.
Do		2,100.00			1 continued from organization of previous year because of failure of mechanical division work to decrease as anticipated.
Shop checker, $1,800				1	Continuation of force transferred to mechanical division with Cristobal roundhouse.
Draftsman, $900				1	Continuation of force from previous year; mechanical division work failed to decrease as anticipated.
Draftsmen, $1,500			2	4	Do.
Draftsmen, $1,650				2	Continued from organization of previous year; mechanical division work did not decrease as expected.
Draftsmen, $1,800			2	4	Continued from organization of previous year; work failed to decrease as anticipated.
Engineer (mechanical), $3,300.				1	Transferred from terminal construction division and approved in organization of July 1, 1914.
Watchmen, $960				3	For Balboa shops and shop yards; Governor's letter of Sept. 24, 1914.
Wreckmaster, $2,400				1	For floating cranes and also in charge of railroad wrecking outfit; Governor's letter of Dec. 16, 1914.
Apprentices	248.80	323.44			4 increased because of reorganization of apprentice system and increase in wage scale, approved by Governor Mar. 11, 1915.
Do	497.60	696.64			1 increased for same reasons as above.
Do	622.00	895.68			Do.

Tables showing increases in salaries authorized over organization of July 1, 1913—Contd.

DEPARTMENT OF OPERATION AND MAINTENANCE—Continued.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
MECHANICAL DIVISION—Continued.					
Blacksmiths, $1,617.20	....	....	16	40	3, see last year's report; 21 continued from organization of previous year; work of mechanical division did not decrease as anticipated.
Boilermakers, $778.24	....	....	6	10	Continued from organization of previous year because of failure of mechanical division work to decrease as anticipated.
Boilermakers, $945.44	....	....	6	10	Do.
Boilermakers, $1,070.08.	....	....	10	12	Do.
Boilermakers, $1,244.	....	....	....	10	Do.
Boilermakers, $1,393.28.	....	....	10	13	Do.
Bricklayer..........	$1,617.20	$1,741.60	....	....	Continued from organization of previous year; Governor's letter of June 19, 1914.
Car repairers, $1,393.28	....	....	35	50	9 continued from organization of previous year; 6 authorized in executive secretary's letter of Jan. 15, 1915. Increase due to East Breakwater rock service and overhauling of Panama Railroad box cars which had been allowed to deteriorate until traffic determined requirements; cars sold Chicago House Wrecking Co. also accounts in part for increase.
Car repairer, $1,617.20	....	....	....	1	Reasons given next above also account for this increase.
Carpenters, $1,393.28.	....	....	6	46	20, see last year's report; 10, continued from organization authorized Apr. 1, 1914; 10 car carpenters authorized in executive secretary's letter of Jan. 23, 1915. Increase due to millwork for permanent structures and East Breakwater rock service and overhauling of Panama Railroad box cars.
Carpenters, $945.44..	....	....	....	3	Authorized in organization of July 1, 1914, due to causes mentioned in item next above.
Carpenters, $796.16..	....	....	....	5	Do.
Chipper and caulkers, $1,393.28.	....	....	....	4	Authorized in organization of July 1, 1914, account of increase in marine work.
Chipper and caulkers, $1,617.20.	....	....	....	12	Do.
Coach cabinetmakers, $1,617.20.	....	....	12	18	1 continued from organization of previous year; 5 authorized in executive secretary's letter of Apr. 5, 1915.
Cutter and welder, $1,094.72.	....	....	....	1	Authorized in organization of July 1, 1914, for oxy-acetylene plant.
Cutter and welder, $1,617.20.	....	....	....	1	Authorized in organization of July 1, 1914, for oxy-acetylene plant.
Crib tenders, $1,500..	....	....	....	2	For fuel-oil handling plants; Governor's letter of Dec. 26, 1914.
Diver, $2,488 and $1,393.28.	....	....	....	1	$1 an hour when diving and 56 cents an hour when not so engaged; for work in connection with floating cranes; authorized in executive secretary's letter of Jan. 29, 1915.
Electricians, $1,800..	....	....	....	2	For floating cranes; Governor's letter of Apr. 24, 1915.
Hostlers, $1,680......	....	....	4	8	Continued from organization of previous year; a greater number of locomotives retained in service than anticipated.
Instrument repairman, $1,617.20.	....	....	....	1	In lieu of machinist at same rate; executive secretary's letter of Aug. 29, 1914.

Tables showing increases in salaries authorized over organization of July 1, 1913—Contd.

DEPARTMENT OF OPERATION AND MAINTENANCE—Continued.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
MECHANICAL DIVISION—Continued.					
Machinists, $1,617.20.	....	....	200	320	Continued from force of previous year and authorized in organization of July 1, 1914; due to continued work on dredging equipment not anticipated.
Operator, gas generator, $1,741.60.	....	....	....	1	Authorized in organization of July 1, 1914, to take charge of oxy-acetylene plant.
Operators, pump, $1,800.	....	....	....	2	For fuel-oil handling plants; Governor's letter of Dec. 26, 1914.
Patternmakers, $1,866	....	....	6	10	Continued from force of previous year and authorized in organization of July 1, 1914, account of mechanical division work failing to decrease as anticipated.
Riveters, $1,393.28	....	....	....	4	Authorized in organization of July 1, 1914, account of increased marine work.
Riveters, $1,617.20	....	....	....	12	Do.
Shipfitters, $778.24	....	....	....	3	Authorized in organization of July 1, 1914, due to increased work on dredging equipment not anticipated.
Shipfitters, $945.44	....	....	....	2	Do.
Shipfitters, $1,070.08	....	....	....	10	Do.
Shipfitters, $1,244	....	....	....	10	Do.
Shipfitters, $1,393.28	....	....	....	11	Do.
Shipfitters, $1,617.20	....	....	....	58	30; see last year's report; 28 authorized in organization of July 1, 1914, due to increased work on dredging equipment not anticipated.
Typewriter repairers	$1,500.00	$1,620.00	....	....	2 increased; see last year's report.
Typewriter repairers, $1,500.	....	....	2	3	Authorized in organization of July 1, 1914, due to increased work account of moving of various offices and deterioration of machines from increased age.

HEALTH DEPARTMENT.

Chief health office:					
Clerks, $2,100	....	....	....	3	Account work in office not decreasing as estimated; 4 of these men transferred to other departments after 2 months' service, and the remaining 4 were taken upon the rolls of executive office Sept. 19, 1914.
Clerks, $1,800	....	....	1	3	
Clerks, $1,500	....	....	....	2	
Medical storehouse:					
Storekeeper, $2,400.	....	....	....	1	Account storehouse transferred to health department from supply department July 1, 1914.
Storekeeper, $2,100.	....	....	....	1	
Storekeeper, $1,800.	....	....	....	1	
Ancon Hospital:					
Druggist	$1,800.00	$2,100.00	....	....	Formerly 1 druggist at $1,800 and 1 at $1,500; necessary to keep both men account amount of work for 4 months, when the position at $1,500 was abolished and the remaining druggist promoted to $2,100; the authorization for this position was later (Mar. 1, 1915) reduced to $1,800.
Druggist, $1,500	....	....	....	1	
Dietist	1,200.00	1,260.00	....	....	Free personal laundry privilege withdrawn, and salary increased $5 per month, same as nurses.
Carpenter	1,617.20	1,791.36	....	....	2 carpenters authorized; only 1 retained, at the increase shown.
Chief nurse	1,800.00	1,860.00	....	....	Free personal laundry privilege withdrawn, and salary increased $5 per month; position of assistant chief nurse abolished July 1, 1914.

Tables showing increases in salaries authorized over organization of July 1, 1913—Contd.

HEALTH DEPARTMENT—Continued.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
Ancon Hospital—Continued.					
Nurses, female, special, $1,020.				3	Effective July 1, 1914, privilege of free personal laundry for nurses was abolished, and salaries of all nurses raised $5 per month; also a permanent scale of wages was established as follows: Entrance salary, $780; after 2 years, $840; after 4 years, $900; after 6 years, $960; the 3 positions at $1,020 to be abolished as soon as practicable.
Nurses, female, $960.				29	
Nurses, female, $900.			41		
Nurses, female, $840.				16	
Nurses, female, $780.				24	
Nurses, female, $720.			42		
			83	72	
Nurse, female, special (operating room) (1).	$1,200.00	$1,260.00			
Nurses, male special, $1,500.			1	2	2 had been previously employed, and the number of patients did not decrease sufficiently to abolish the one position until June 30, 1915.
Chaplains, $1,200.			1	2	Necessary to have 1 Catholic and 1 Protestant.
Clerks, $1,800				3	At the end of the fiscal year 1914 there were in service 2 clerks at $1,800 and 3 at $1,500; 1 of those at $1,500 was subsequently promoted to $1,800 by authority of the Governor and it would not be possible to reduce these numbers further as long as the size of the hospital remains as at present.
Clerks, $1,500			4	2	
			4	5	
Quartermaster, $2,100.				1	In place of 1 foreman at $1,800; position, abolished Nov. 24, 1914.
Steward, $2,100				1	Originally employed at $1,500 on June 1, 1914, and placed in charge of all messes in the hospital, replacing 1 silver-roll man and reducing salary of head cook. Promoted to $2,100 on Nov. 24, 1914, account taking over additional work formerly performed by the quartermaster.
Physicians, $2,400.			6	14	At the end of the fiscal year 1914 the number of physicians at $2,400 had been increased by regular promotion to 14, the number at $1,800 having been correspondingly reduced. The number of $2,400 physicians has been gradually reduced to 5 at the end of the fiscal year 1915.
Plumber	1,800.00	1,866.00			This work was for a time performed by a plumber in supply department at 81 cents per hour; when work was turned over to health department salary of this man was reduced from 81 cents to 75 cents per hour ($1,866 per year), instead of employing him at annual rate of $1,800.
Colon Hospital:					
Superintendent, $3,600.				1	Estimate for Colon Hospital not made in Book of Estimates as it was then proposed to abandon this institution. Owing to the number of employees still stationed at the Atlantic end, which is not likely to decrease, it will be necessary to continue this hospital. One physician at $3,000 and 1 at $2,400 were taken up on rolls of Colon Hospital when Cristobal Dispensary was consolidated with the hospital. Total number of nurses for the department was not exceeded.
Physician, $3,000.				1	
Physicians, $2,400.				2	
Clerk, $1,800				1	
Storekeeper, $1,500.				1	
Druggist, $1,500				1	
Nurses, female, $960.				5	

Tables showing increases in salaries authorized over organization of July 1, 1913—Contd.

HEALTH DEPARTMENT—Continued.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
Line hospitals:					At the end of the fiscal year 1914 there were in service 5 physicians at $3,000 and 9 at $2,400; this number has been gradually reduced until at the close of the fiscal year 1915 we had 3 at $3,000, 4 at $2,400, and 1 at $1,800; it was impossible to reduce this number further as it was found impracticable to abandon several stations which were expected to be out of service during the fiscal year 1915. There were but 8 male nurses and no druggists at the end of the fiscal year 1915.
Physicians, $3,000.	....	....	5	5	
Physicians, $2,400.	....	....	....	9	
			5	14	
Nurses, male, $1,260.	....	....	5	9	
Druggists, $1,200.	....	....	....	2	
Santo Tomas Hospital:					No positions were included in Book of Estimates for Santo Tomas, but to keep health conditions in Panama entirely under our supervision and control it is necessary to continue these positions the same as formerly. Salaries of nurses increased account free laundry privilege withdrawn.
Superintendent, $3,600.	....	....	....	1	
Physicians, $1,800.	....	....	....	2	
Nurse, chief, $1,560.	....	....	....	1	
Nurses, female, $960.	....	....	....	2	
Health office, Panama:					
Assistant health officer, $2,700 (Panama Canal, $700; Army, $2,000).	....	....	....	1	The Book of Estimates provided 1 health officer at $4,500. Owing to the rapid growth of the city of Panama and an increase in population of over 33 per cent, it was necessary to appoint an assistant health officer at $2,700 (Army pay, $2,000). For the same reasons it was necessary to increase the number of sanitary inspectors over the 6 provided in estimates to 8.
Inspectors, $2,100.	....	....	2	2	
Inspectors, $1,800.	....	....	2	3	
Inspectors, $1,500.	....	....	2	3	
			6	8	
Clerk, $900	....	....	....	1	At the end of the fiscal year 1914 this clerk was in service, and it was impossible to abolish the position owing to the work increasing.
Health office, Colon:					
Inspector, sanitary, $2,100.	....	....	1	....	At the end of the fiscal year 1914 there were in service 3 at $1,800 and 3 at $1,500; 1 at $1,500 was subsequently promoted by authority of the Governor to $1,800. Impossible to reduce the force on account of work not decreasing.
Inspectors, sanitary, $1,800.	....	....	1	4	
Inspectors, sanitary, $1,500.	....	....	2	2	
			4	6	
Zone sanitation:					
Inspectors, $2,100.	....	....	1	6	At the end of the fiscal year 1914 there were in service 9 sanitary inspectors; this number has been decreased to 6 at the end of the fiscal year 1915, but no further decrease is practicable until additional towns are abandoned.
Inspectors, $1,800.	....	....	1	2	
Inspector, $1,500.	....	....	1	1	
			3	9	
Foreman, $900	....	....	....	1	To look after civil population on west side of canal.
Quarantine service:					
Chief quarantine officer, $4,500 (including $2,640 United States Public Health Service pay).	....	....	....	1	Position of quarantine officer at $5,000 provided in Book of Estimates was filled by chief quarantine officer at $4,500.

Tables showing increases in salaries authorized over organization of July 1, 1913—Contd.

HEALTH DEPARTMENT—Continued.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
Quarantine service—Continued.					
Custodian	$1,500.00	$1,800.00	....	....	1 custodian and 1 disinfector-master given $150 per month each without subsistence, in lieu of $125 per month with subsistence.
Disinfector-master.	1,500.00	1,800.00	....	....	
Quarantine guard, $1,200.	....	....	....	1	To take ships through the canal "In quarantine." Amount more than repaid to Panama Canal by charge for services.
Ancon Hospital:					
Laboratory assistant.	1,260.00	1,500.00	....	....	Salary of 1 laboratory assistant raised for a period of 8 months only, while doing special and overtime work preparing exhibit for the Panama-Pacific Exposition; amount of increase charged to appropriation for exhibit.

ACCOUNTING DEPARTMENT.

Paymaster's office:					
Clerk, $2,100	....	....	....	1	Increase of 1 clerk at $175, account of pay office taking over the payments of the Panama Railroad Oct. 16, 1914.
Assistant paymaster, $3,900.	....	....	....	1	Position of assistant paymaster created at $3,900, to take the place of cashier, at $3,600, on account of having to provide a special paymaster under $200,000 bond to carry the account and risks for 3 months each year.

SUPPLY DEPARTMENT.

Steam engineers, $1,500.	....	....	....	2	On account of direction of Governor Dec. 19, 1914, that silver men be not allowed to operate cranes.
Plumber	....	$1,741.60	....	1	1 increased on account of increased work in Ancon-Balboa district.
Stewards	$1,650	1,800.00	....	....	Increased duties as manager Hotel Aspinwall. Reduced to $1,650 June 30.
Foremen, $1,500	....	....	12	13	Custodian Administration Building, Balboa Heights.

Table showing increases in salaries authorized over organization of July 1, 1913—Contd.

EXECUTIVE DEPARTMENT.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
EXECUTIVE OFFICE.					
Governor, $10,000				1	Due to the consolidation of practically all clerical work for The Panama Canal and the Panama Railroad Co. under the executive office, several new bureaus were established during the fiscal year 1915, necessitating the creation of a number of new positions, which it is impossible to identify with those listed under "Office of chairman and chief engineer," page 7, of Book of Estimates for 1915. The new positions created were filled by transfers from other departments and divisions (reducing the force in such departments and divisions), and the consolidation thus effected has resulted in a total net saving.
Executive secretary, $6,000.				1	
Chief personnel bureau, $2,400.				1	
Chief correspondence bureau, $2,700.				1	
Superintendent, clubs and playgrounds, $3,000.				1	
General foreman, $2,100.				1	
Assistant engineer, $2,400.				1	
Secretaries (Y. M. C. A.), $2,100.				4	
Secretaries, assistant, $1,500.				4	
Secretary (colored), $1,500.				1	
Secretary (colored), $1,200.				1	
Librarian, $1,500				1	
Motormen, $1,800				3	
Clerk, $2,250				1	
Clerks, $2,100			10	27	
Clerks, $1,950			2	4	
Clerks, $1,800			20	56	
Clerks, $1,650			5	21	
Clerks, $1,500			12	22	
Clerks, $900			3	6	
Clerks, $720			1	6	
Clerks, $600			3	6	
Clerk, $540				1	
Trainman, $450				1	
Trainmen, $420				4	
Printers (25c. hr.), $608.				2	
Artisan (22c. hr.), $535.04.				1	
Artisan (18c. hr.), $437.76.				1	
Pressman (18c. hr.), $437.76.				1	
Storeman, $600				1	
Messengers, $600				4	
Messenger, $540				1	
Messengers, $480				16	
Messenger, $300				1	
Messenger, $210				1	
DIVISION OF CIVIL AFFAIRS.					
Chief of division of civil affairs, $3,600.				1	Position authorized in connection with permanent organization. Has charge of work formerly handled by collector of revenues and secretary of Isthmian Canal Commission.
Chief customs inspectors, $2,100.				2	Chief customs inspectors handle part of work formerly handled by deputy collectors at $2,500. Reorganization and increase of customs personnel rendered necessary by increase of shipping following opening of canal. One inspector at $1,200 abolished.
Customs inspectors, $1,800.			1	3	
Customs inspectors, $1,500.			2	4	
Post-office inspector	$2,100	$2,400			Increased duties and responsibilities. Acts as assistant director of posts, work formerly handled by the deputy collector.

Tables showing increases in salaries authorized over organization of July 1, 1913—Contd.

EXECUTIVE DEPARTMENT—Continued.

	Increase in pay.		Increase in numbers.		Explanation.
	Rate authorized in organization July 1, 1913.	Increased to—	Number authorized in 1915 Book of Estimates.	Increased to—	
DIVISION OF CIVIL AFFAIRS—contd.					
Postmasters, $2,700			1	2	Reclassification of post offices due to shifting centers of population. Following positions were abolished: 1 postmaster at $2,600, 1 at $2,400, 1 at $2,300, 2 at $1,700, and 2 at $900.
Postmaster, $2,100				1	
Postmaster, $1,900				1	
Postmasters, $1,500				4	
Postmaster, $360				1	
Assistant postmasters, $1,800.			1	2	Assistant postmaster at Ancon promoted from $1,650 to $1,800 account increased business.
Postal clerks, $1,650				3	One of these chief dispatch clerk at Cristobal. Increase explained in last annual report. Money-order clerks at Ancon and Cristobal increased to compensate them for additional responsibility and risk of loss through small shortages. Three assistant postmasters at $1,650 abolished.
Postal clerks, $1,500			25	26	It proved impossible to reduce force in post offices as rapidly as had been contemplated, but before end of fiscal year number of clerks at $1,500 was reduced to 24, and number at $900 to 5. One position at $720 abolished.
Postal clerks, $900			4	7	

WASHINGTON OFFICE.

Temporary clerks for all offices.	$2,000	$4,423.71			Excess of $2,423.71 due to increased work throughout the whole office. Approved by the Governor Oct. 8, 1914.
Special counsel and examiner of claims, $5,000; appointed May 13, 1915.				1	These three additional employees have been on duty in connection with the examination of the McClintic-Marshall Construction Co.'s claims, as provided by the act of June 24, 1914, their employment having been authorized by Maj. Gen. Geo. W. Goethals, U. S. Army, Governor of The Panama Canal.
Clerk, $1,500; appointed Feb. 4, 1915.				1	
Expert stenographer, $10 a day when employed; appointed Apr. 8, 1915.				1	

APPENDIX O.

ACTS OF CONGRESS AFFECTING THE PANAMA CANAL AND EXECUTIVE ORDERS RELATING TO THE CANAL ZONE.

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APPENDIX O.

ACTS OF CONGRESS AFFECTING THE PANAMA CANAL AND EXECUTIVE ORDERS RELATING TO THE CANAL ZONE.

JOINT RESOLUTION To continue the provisions of a joint resolution approved June thirtieth, nineteen hundred and fourteen, entitled "Joint resolution extending appropriations for the necessary operations of the Government and of the District of Columbia under certain contingencies."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of a joint resolution entitled "Joint resolution extending appropriations for the necessary operations of the Government and of the District of Columbia under certain contingencies." approved June thirtieth, nineteen hundred and fourteen, are extended and continued in full force and effect for and during the last half of the month of July, fiscal year nineteen hundred and fifteen.

* * * * * * *

Approved, July 16, 1914.

AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and fifteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, for the objects hereinafter expressed, for the fiscal year ending June thirtieth, nineteen hundred and fifteen, namely:

* * * * * * *

UNDER THE WAR DEPARTMENT.

* * * * * * *

NATIONAL CEMETERIES.

* * * * * * *

Disposition of remains of officers, soldiers, civilian employees, and so forth: For expenses of interment, or of preparation and transportation to their homes or to such national cemeteries as may be designated by proper authority, in the discretion of the Secretary of War, of the remains of officers, including acting assistant surgeons, and enlisted men of the Army active list; for the expenses of interment, or of preparation and transportation to their homes, of the remains of civil employees of the Army in the employ of the War Department who die abroad, inclusive of Alaska and the Canal Zone, Panama, or on Army transports, or who die while on duty in the field or at military posts within the limits of the United States; for the expenses of interment of military prisoners who die at military posts; for the expenses of removal of remains from abandoned posts to permanent military posts or national cemeteries, including the remains of Federal soldiers, sailors, or marines, interred in fields or abandoned private and city cemeteries; and in any case where the expenses of burial or shipment of the remains of officers or enlisted men of the Army who die on the active list are borne by individuals, where such expenses would have been lawful claims against the Government, reimbursement to such individuals may be made of the amount allowed by the Government for such services, to be paid out of the funds appropriated by this Act, but no reimbursement shall be made under this Act of such expenses incurred prior to July first, nineteen hundred and ten, $57,500.

* * * * * * *

UNDER THE DEPARTMENT OF COMMERCE.

* * * * * * *

COAST AND GEODETIC SURVEY.

* * * * * * *

Field expenses. For surveys and necessary resurveys of the Atlantic and Gulf coasts of the United States, including the coasts of outlying islands under the jurisdiction of the United States: *Provided*, That not more than $25,000 of this amount shall be expended on the coasts of said outlying islands, and the Atlantic entrance to the Panama Canal, $65,000;

* * * * * * *

PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

Building to install the Government exhibit at the Panama-Pacific International Exposition: For the construction of a suitable building in that part of the reservation of the United States known as the Presidio of San Francisco, State of California, in which the Government Exhibit Board, created by the sundry civil appropriation Act approved June twenty-third, nineteen hundred and thirteen, shall install, display, and safeguard the exhibit of the Government of the United States at the Panama-Pacific International Exposition, $500,000: *Provided*, That the said building shall be so located and planned and shall be of such a permanent character as will make it available and useful for military purposes of the United States after the close of the said exposition, and shall be on such general plan and design and in such location as shall be approved by the Secretary of War: *Provided further*, That the said building shall be erected under the authority of the Secretary of War, by contract or otherwise, as he may direct: *Provided further*, That not exceeding $50,000, or so much thereof as may be necessary, may be expended from the appropriation made herein, on the approval and authority of the Secretary of War, for entertaining the officers and representatives of foreign governments who may attend and participate in the Panama-Pacific International Exposition in consequence of the invitation of the President of the United States, extended in pursuance of the authority of Congress.

The provisions contained in the Act entitled "An act making appropriations for the sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and fourteen," which provides for the participation of the United States in the Panama-Pacific International Exposition, be amended as follows: Under the head of "To provide for the participation of the United States in the Panama-Pacific International Exposition," the paragraph on page eighty-one, which reads as follows: "The President of the United States is authorized to detail three civilian officers or employees from the executive departments as members of a commission which is hereby constituted as the National Exposition Commission, one of said commissioners, who shall be the chairman of said commission, shall be detailed from the Department of State. Vacancies in said commission shall be filled in the same manner as original appointments. Each commissioner shall receive in addition to his original compensation his actual necessary traveling expenses and an allowance of $10 per day in lieu of subsistence. Said commissioners may appoint a secretary at $2,500 per annum, and the sum of $15,000, or so much thereof as may be necessary, may be expended for clerical, office, and other necessary and actual expenses of said commission," and insert in lieu thereof the following: "The President of the United States is authorized to detail two civilian officers or employees from the executive departments, also one to be appointed from civil life, as members of the commission which is hereby constituted as the National Exposition Commission; one of said commissioners, who shall be the chairman of said commission, shall be detailed from the Department of State, the commissioner appointed from civil life to receive a salary at the rate of $5,000 per annum until the exposition closes. Vacancies in said commission shall be filled in the same manner as original appointments. Each commissioner detailed as aforesaid shall receive, in addition to his original compensation, necessary traveling expenses and an allowance of $10 per day in lieu of subsistence while on duty in San Francisco. Said commissioners may appoint a secretary at $2,500 per annum, and the sum of $15,000, or so much thereof as may be necessary, may be expended for clerk hire and actual expenses of said commission."

Copyright and patent branch office, Panama-Pacific International Exposition: To defray all the expenses connected with the establishment, equipment, and maintenance (including necessary printing) of the branch office at San Francisco, California, provided for in section two of the Act approved September eighteenth, nineteen hundred and thirteen (Public, Numbered Fourteen), $30,000, of which sum $15,000, or so much thereof as may be necessary, shall be expended under the direction of the Secretary of the Interior, and $15,000, or so much thereof as may be necessary, shall be expended under the direction of the Librarian of Congress, each of whom is authorized to pay to the Public Printer the cost of any portion of such printing and binding required for the said branch office which may be ordered by him from the Government Printing Office; to designate from among the employees of the Patent Office and Copyright Office, respectively, such employees as may be actually necessary for the service of the respective divisions of the said branch office, one of the employees so designated from each of said bureaus to act as his disbursing officer; and to select and employ from time to time at San Francisco such additional persons as the exigencies of the work there may require. All persons from the Patent Office and Copyright Office thus designated for service at San Francisco shall receive no compensation other than their regular salaries, but while absent from Washington, District of Columbia, and engaged upon the business of the aforesaid branch office shall be allowed their actual and necessary traveling expenses, together with a per diem allowance in lieu of the cost of subsistence to be fixed by the Secretary of the Interior or Librarian of Congress designating such persons, not to exceed $3 per day.

The Government Exhibit Board, for which provision was made in the sundry civil Act approved June twenty-third, nineteen hundred and thirteen, shall, after consultation by correspondence or otherwise with the heads of the executive departments and the Regents of the Smithsonian Institution, the Isthmian Canal Commission, the Interstate Commerce Commission, the Civil Service Commission, the Commissioners of the District of Columbia, the American National Red Cross, the Commission of Fine Arts, the Librarian of Congress, the Public Printer, the Governor of Porto Rico, the Governor of Alaska, the Governor of Hawaii, and the United States Geographic Board, determine the nature, character, and extent of the exhibits of the United States Government to be made at the Panama-Pacific International Exposition, to be held at San Francisco, California, in nineteen hundred and fifteen, and shall be charged with the selection, purchase, preparation, safe-keeping, exhibition, and return of such articles and materials as said board may decide shall be exhibited; and the said board is empowered to select, purchase, and exhibit articles or materials representing the activities of any department, office, commission, or organization named in this paragraph.

* * * * * * *

The Panama Canal.

To continue the construction of the Panama Canal, to be expended under the direction of the President, in accordance with an Act entitled "An Act to provide for the construction of a canal connecting the waters of the Atlantic and Pacific Oceans," approved June twenty-eighth, nineteen hundred and two, and Acts amendatory thereof or supplementary thereto:

First. For salaries of officers and employees of the Panama Canal, including assistant purchasing and shipping agents, and all other employees in the United States, $150,000;

Second. For incidental expenses, encluding rents, cable and telegraph service, supplies, stationery and printing, and actual necessary traveling expenses in the United States (including rent of offices in the District of Columbia not exceeding $7,500, textbooks and books of reference, $1,000, and additional compensation to the Auditor for the War Department for extra services in auditing accounts for the Panama Canal, $1,000), $62,000;

Third. For pay of the Governor of the Panama Canal and officers and employees on the Isthmus, other than skilled and unskilled labor, including civil engineers, superintendents, instrumentmen, transitmen, levelmen, rodmen, draftsmen, timekeepers, mechanical and electrical engineers, quartermasters, clerks, accountants, stenographers, storekeepers, messengers, office boys, foremen and subforemen, wagon masters, watchmen, and stewards, including those temporarily detailed for duty away from the Isthmus, in the departments of construction and engineering, quartermaster's, subsistence, disbursements and examination of accounts, and for those employed in connection with the preservation of plans, drawings, and other records, $2,414,000.

Fourth. For skilled and unskilled labor on the Isthmus, including engineers, conductors, firemen, brakemen, electricians, teamsters, cranesmen, machinists, blacksmiths, and other artisans, and their helpers; janitors, sailors, cooks, waiters, and dairymen, for the departments of construction and engineering, quartermaster's, subsistence, disbursements and examination of accounts, $7,000,000;

Fifth. For the purchase and delivery of material, supplies, and equipment, including cost of inspecting material and of paying traveling expenses incident thereto, whether on the Isthmus or elsewhere; purchase, maintenance, and repair of motor cars, fire-fighting apparatus, towing locomotives, and other motor-propelled vehicles, and such other expenses not in the United States as the governor deems necessary to best promote the construction of the Panama Canal, and such expenses as are incurred in assembling, sorting, storing, repairing, and selling material, supplies, and equipment heretofore or hereafter purchased or acquired for the construction of the Panama Canal, which are unserviceable or no longer needed, including the amount necessary to continue the construction of the two colliers provided for under the Act approved June twenty-third, nineteen hundred and thirteen, subject to the limit of cost therein fixed, and including the payment of damages caused to the owners of private lands, or private property of any kind, by reason of the grants contained in the treaty between the United States and the Republic of Panama proclaimed February twenty-sixth, nineteen hundred and four, or by reason of the operations of the United States, its agents or employees, or by reason of the construction, maintenance, operation, sanitation, and protection of the said canal or of the works of sanitation and protection therein provided for, whether compromised by agreement between the claimant and the chairman of the commission or allowed by a joint commission, and the payment for land and land under water as authorized in section three of the Panama Canal Act, for the departments of construction and engineering, quartermaster's, subsistence, disbursements, and examination of accounts, and including also payment to the Wheeling Mold and Foundry Company, of Wheeling, West Virginia, of the sum of $9,076.21, to carry into effect an equitable settlement with that company which could not be made by reason of the ruling of the Comptroller of the Treasury, this sum having been deducted as liquidated damages on the various contracts and being in excess of the actual damages to the commission, $9,000,000;

Sixth. For miscellaneous expenditures, cable and telegraph service, stationery and printing, local railway transportation, special trains, including pay-train service; transportation of currency to the Isthmus, recruiting and transporting laborers, transporting employees from the United States, repatriating laborers and employees, actual necessary traveling expenses while on the Isthmus on official business; expenses incident to conducting hearings and examining estimates for appropriations on the Isthmus, and all other incidental and contingent expenses not otherwise provided for, for the departments of construction and engineering, quartermaster's, subsistence, disbursements and examination of accounts, $725,000;

Seventh. For pay of officers and employees of the department of civil administration, including foremen, subforemen, skilled and unskilled labor, watchmen, messengers, and storekeepers, of the departments of civil administration and law, including those necessarily and temporarily detailed for duty away from the Isthmus and for expenses of the official representation of Congress attending the formal opening of the canal, $500,000;

Eighth. For the operation, maintenance, and extension of waterworks, sewers, and pavements in the cities of Panama and Colon, during the fiscal year nineteen hundred and fifteen, the necessary portion of such sums as shall be paid as water rentals or directly by the Government of Panama for such expenses;

Ninth. For material, supplies, equipment, construction and repairs of buildings, and contingent expenses of the departments of civil administration and law, including not exceeding $500 for law books, $72,000;

Tenth. For pay of the officers and employees other than skilled and unskilled labor, including hospital dispensers, internes, nurses, attendants, messengers. office boys, foremen and subforemen, watchmen, and stewards, of the department of sanitation on the Isthmus, including those temporarily detailed for duty away from the Isthmus, $300,000;

Eleventh. For skilled and unskilled labor of every grade and kind, for the department of sanitation on the Isthmus, $120,000;

Twelfth. For material, supplies, equipment, construction and repairs of buildings, medical aid and support of the insane and of indigent persons permanently disabled while in line of duty and in the employ of the Panama Canal from earning a livelihood, and contingent expenses of the department of sanitation on the Isthmus, including not exceeding $75,000 for removal of quarantine station from Culebra Island to the vicinity of Balboa and for converting the hospital at Colon into a quarantine station and for new equipment for both, $375,000.

The foregoing sums, so far as necessary, shall be available for the operation of the canal, for the permanent organization authorized to be established under the Panama Canal Act, for dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances, including the collection of tolls, for the purpose of providing coal and other materials, labor, repairs, and supplies, for office buildings, quarters, and other necessary buildings, for the payment of claims arising out of injuries or deaths of employees; and for the consolidation and preservation of the files of papers and other records which have accumulated or may accumulate during the construction of the canal and needed or useful or having a permanent value or historical interest.

In all, $20,718,000, the same to be immediately available and to continue available until expended: *Provided*, That all expenditures from the appropriations heretofore, herein, and hereafter made for the construction of the Panama Canal, including any portion of such appropriations which may be used for the construction of dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances, for the purpose of providing coal and other materials, labor, repairs, and supplies, for the construction of office buildings and quarters, and other necessary buildings, exclusive of fortifications and colliers, and exclusive of the amount used for operating and maintaining the canal, and for the permanent organization after the canal is opened for use and operation, may be paid from or reimbursed to the Treasury of the United States out of the proceeds of the sale of bonds authorized in section eight of the said Act approved June twenty-eighth, nineteen hundred and two, and section thirty-nine of the Tariff Act approved August fifth, nineteen hundred and nine.

Except in cases of emergency, or conditions arising subsequent to and unforeseen at the time of submitting the annual estimates to Congress, and except for those employed in connection with the construction of permanent quarters, offices and other necessary buildings, dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances for the purpose of providing coal and other materials, labor, repairs, and supplies, and except for the permanent operating organization under which the compensation of the various positions is limited by section four of the Panama Canal Act, there shall not be employed at any time during the fiscal year nineteen hundred and fifteen under any of the foregoing appropriations for the Panama Canal, any greater number of persons than are specified in the notes submitted respectively in connection with the estimates for each of said appropriations in the annual Book of Estimates for said year, nor shall there be paid to any of such persons during that fiscal year any greater rate of compensation than was authorized to be paid to persons occupying the same or like positions on the first day of July, nineteen hundred and thirteen; and all employments made or compensation increased because of emergencies or conditions so arising shall be specifically set forth, with the reasons therefor, by the governor in his report for the fiscal year nineteen hundred and fifteen.

In cases of emergencies arising subsequent to and unforeseen at the time of submitting the annual estimates to Congress, ten per centum of the foregoing amounts shall be available interchangeably for expenditure on objects named; but not more than ten per centum shall be added to any one item of the appropriation.

FORTIFICATIONS, PANAMA CANAL.

For the following for fortifications and armament thereof for the Panama Canal, to be immediately available and to continue available until expended, namely:

Electric light and power plants: For the purchase and installation of electric light and power plants for the seacoast fortifications on the Canal Zone, $33,550;

For buildings and material:
  Toro Point—
  One concrete storehouse, $5,000;
  Ten buildings, at $900 each, $9,000;
  Miraflores or Gatun—One storehouse, $5,000;
  Obstacles—
  Two thousand five hundred coils of barbed wire, at $3 each, $7,500;
  Two thousand five hundred pounds of staples, at $0.03, $75;
  Telephone line—Twenty-two miles, at $1,400 per mile, $30,800;
In all, $57,375.

For maintenance of clearings and trails:
  Clearings, four thousand three hundred and seventy acres, $21,000;
  Trails, seventy miles, $900;
In all, $21,900.

For the purchase, manufacture, and test of ammunition for seacoast and land defense cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture at the arsenals, $233,000: *Provided,* That the Chief of Ordnance, United States Army, is authorized to enter into contracts or otherwise incur obligations for the purposes above mentioned not to exceed $500,000, in addition to the appropriation herein made;

For the alteration, maintenance, and installation of the seacoast artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work, and expenses of civilian mechanics, and extra-duty pay of enlisted men engaged thereon, $26,000;

For alteration, maintenance, and repair of submarine mine material, $2,700;

Fire control: For the construction of fire-control stations and the purchase and installation of accessories therefor, $50,000;

For construction on the Panama Canal Zone of barracks, quarters, storehouses, and other buildings necessary for accommodating the mobile army and Coast Artillery troops to be stationed there, including water, sewer, and lighting systems, roads, walks, and so forth, and for repairing and remodeling existing buildings to render them suitable for sheltering troops, $700,000.

In all, specifically for fortifications and armament thereof for the Panama Canal, $1,124,475.

Sec. 2. That all funds collected by the Government of the Canal Zone from rentals of public lands and buildings in the Canal Zone and the cities of Panama and Colon, and from the zone postal service, and from court fees and fines, and collected or raised by taxation in whatever form under the laws of the Government of the Canal Zone, are hereby appropriated until and including June thirtieth, nineteen hundred and fifteen, as follows: The revenues derived from the postal service to the maintenance of that service; the remaining revenues, including any balances unexpended in prior years, after setting aside a miscellaneous and contingent fund of not exceeding $10,000, to the maintenance of the public-school system in the zone; to the construction and maintenance of public improvements within the zone; to the maintenance of the administrative districts; and for the expenses of the subdivisions of the Canal Zone after they are established under section seven of the Panama Canal Act; to the maintenance of Canal Zone charity patients in the hospitals of the Panama Canal; and to the maintenance of administrative district prisoners: *Provided,* That, if the revenues of the Canal Zone government are not sufficient for the purposes herein specified, the necessary part of the amounts appropriated for the departments of civil administration and law, under items seven and nine, may be used therefor. A detailed and classified statement of all receipts and expenditures without the duplication of items under this paragraph shall be submitted to Congress after the close of the fiscal year nineteen hundred and fifteen.

Sec. 3. That during the fiscal year nineteen hundred and fifteen all moneys received by the governor of the Panama Canal, from any services rendered or materials and supplies furnished to employees of the United States or of the

Panama Railroad Company, to the Panama Railroad Company, to the Canal Zone government, to the Panama Government, and to other departments of the United States Government, from hotel and hospital supplies and services; from rentals, wharfage, and so forth; from labor, materials, and supplies and other services furnished to vessels and to those unable to obtain similar labor, materials, supplies, and services elsewhere; from the sale of scrap and other byproducts of manufacturing and shop operations; from the sale of obsolete and unserviceable material, supplies, and equipment purchased or acquired for the operation, maintenance, protection, sanitation, and government of the canal and Canal Zone; and from exchanges of typewriting, adding, and other machines, shall be credited to the appropriation from which payments for the materials, supplies, labor, or other services were originally made. Moneys heretofore or hereafter received from the sale of material, supplies, and equipment purchased or acquired for the construction of the Panama Canal, after deducting all expenses of assembling, sorting, storing, repairing, and selling such material, supplies, and equipment, which deductions shall be credited to the appropriations from which such expenses are paid, and the moneys received as a reimbursement for the expenditures incurred in constructing waterworks, sewers, and pavements in the cities of Panama and Colon, including interest on such expenditures, excluding payments on account of the expenses for maintenance of such waterworks, sewers, and pavements incurred under agreement with the Panama Government, and otherwise herein disposed of, shall be covered into the Treasury as miscellaneous receipts. After the canal is opened for use and operation the net profits accruing during the fiscal year nineteen hundred and fifteen from the operations herein authorized shall be covered into the Treasury of the United States, as provided for the profits accruing from the business authorized in section six of the Panama Canal Act.

Sec. 4. That the consolidation of the functions of receiving, disbursing, and accounting for the funds of the Canal Zone government and the Panama Railroad operations on the Isthmus with the functions of receiving, disbursing, and accounting for the funds appropriated for the Panama Canal shall be and is hereby authorized in so far as may be practicable: *Provided*, That separate accounts shall be kept of the transactions under each fund.

Sec. 5. That the collecting officers of the Panama Canal shall render their accounts in such detail, and shall transmit with their accounts to the accounting officers of the Treasury charged with the settlement thereof all such papers, records, and copies relating to their transactions as collectors as shall be prescribed in regulations approved by the President, and, in his judgment, not incompatible with the methods of accounting prescribed in the so-called Dockery Act, approved July thirty-first, eighteen hundred and ninety-four.

Sec. 6. That for the fiscal year nineteen hundred and sixteen and annually thereafter the estimates of appropriations for the Panama Canal shall be submitted in detail, showing the amounts required for personal services and the amounts required for material including all supplies, under the heads of construction, maintenance, operation, sanitation, and civil government, and following each there shall be submitted notes giving in parallel columns information which will show the number, by grade or classes, of officers, employees, and skilled and unskilled laborers proposed to be paid under each of said appropriations for the ensuing fiscal year and those paid at the close of the fiscal year next preceding the period when said estimates are prepared and submitted; also, in connection with each item for material and miscellaneous purposes other than salaries or pay for personal services, the amounts actually expended or obligated, quantities purchased, and prices paid for material or supplies during the entire fiscal year next preceding the preparation and submission of said estimates.

There shall also be submitted in connection with the foregoing information, statements of actual unit cost of all construction work done, and of estimated unit cost of work proposed to be done, for the fiscal years included in the notes so required to be submitted with the annual estimates.

Sec. 7. That the appropriations herein made for the Panama Canal, other than those for fortifications, or balances thereof, may be available, during the last half of the fiscal year nineteen hundred and fifteen, for expenditure for the purposes indicated by the several titles enumerated in the foregoing section, namely, construction, maintenance, operation, sanitation, and civil government, and be accounted for at the end of that year in such detail or classification, respectively, thereunder as may be determined by the governor of the Panama Canal, or hereafter required by Congress; and such balances may, on and after

January first, nineteen hundred and fifteen, constitute one fund for expediture under said respective titles.

Sec. 8. That until the close of the fiscal year nineteen hundred and fifteen, when any material, supplies, and equipment heretofore or hereafter purchased or acquired for the construction of the Panama Canal is no longer needed, or is no longer serviceable, it may be sold in such manner as the President may direct, and without advertising in such classes of cases as may be authorized by him.

Sec. 9. Appropriations herein for printing and binding shall not be used for any annual report or the accompanying documents unless the head of each executive department, or other branch of the public service, or the Commissioners of the District of Columbia making such a report shall furnish copy to the Public Printer in the following manner: Copies of the documents accompanying such annual reports on or before the fifteenth day of October of each year; copies of the annual reports on or before the fifteenth day of November of each year; and complete revised proofs of the accompanying documents and the annual reports on the tenth and twentieth days of November of each year, respectively. The provision of this section shall not apply to the annual reports of the Smithsonian Institution.

Sec. 10. That section six of the sundry civil appropriation Act approved August twenty-fourth, nineteen hundred and twelve, is amended to read as follows:

> "*Sec. 6.* That there shall be submitted hereafter, in the annual Book of Estimates following every estimate for a general or lump sum appropriation, except public buildings or other public works constructed under contract, a statement showing in parallel columns:
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> "*First*, the number of persons, if any, intended to be employed and the rates of compensation to each, and the amounts contemplated to be expended for each of any other objects or classes of expenditures specified or contemplated in the estimate, including a statement of estimated unit cost of any construction work proposed to be done; and
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> "*Second*, the number of persons, if any, employed and the rate of compensation paid each, and the amounts expended for each other object or class of expenditure, and the actual unit cost of any construction work done, out of the appropriation corresponding to the estimate so submitted, during the completed fiscal year next preceding the period for which the estimate is submitted.
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> "Other notes shall not be submitted following any estimate embraced in the annual Book of Estimates other than such as shall suggest changes in form or order of arrangement of estimates and appropriations and reasons for such changes."

Sec. 11. That no part of any money appropriated by this Act shall be used during the fiscal year nineteen hundred and fifteen for the purchase of any typewriting machine at a price in excess of the lowest price paid by the Government of the United States for the same make and substantially the same model of machine during the period of the fiscal years nineteen hundred and thirteen and nineteen hundred and fourteen; such price shall include the value of any typewriting machine or machines given in exchange, but shall not apply to special prices granted on typewriting machines used in schools of the District of Columbia or of the Indian Service.

Sec. 12. That it shall not be lawful hereafter to pay to any person, employed in the service of the United States under any general or lump sum appropriation, any sum additional to the regular compensation received for or attached to any employment held prior to an appointment or designation as acting for or instead of an occupant of any other office or employment. This provision shall not be construed as prohibiting regular and permanent appointments by promotion from lower to higher grades of employments.

Sec. 13. That the heads of executive departments and other Government establishments are authorized to prescribe per diem rates of allowance not exceeding $4 in lieu of subsistence to persons engaged in field work or traveling on official business outside of the District of Columbia and away from their designated posts of duty when not otherwise fixed by law. For the fiscal year nineteen hundred and sixteen and annually thereafter estimates of appropriations from which per diem allowances are to be paid shall specifically state the rates of such allowances.

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Sec. 14. That all sums appropriated by this Act for salaries of officers and employees of the Government shall be in full for such salaries for the fiscal year nineteen hundred and fifteen, and all laws or parts of laws to the extent they are in conflict with the provisions of this Act are repealed.

Approved, August 1, 1914.

AN ACT To provide for the admission of foreign-built ships to American registry for the foreign trade, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the words "not more than five years old at the time they apply for registry" in section five of the Act entitled "An Act to provide for the opening, maintenance, protection, and operation of the Panama Canal and the sanitation and goverment of the Canal Zone," are hereby repealed.

Sec. 2. That the President of the United States is hereby authorized, whenever in his discretion the needs of foreign commerce may require, to suspend by order, so far and for such length of time as he may deem desirable, the provisions of law prescribing that all the watch officers of vessels of the United States registered for foreign trade shall be citizens of the United States.

Under like conditions, in like manner, and to like extent the President of the United States is also hereby authorized to suspend the provisions of the law requiring survey, inspection, and measurement by officers of the United States of foreign-built vessels admitted to American registry under this Act.

Sec. 3. This Act shall take effect immediately.

Approved, August 18, 1914.

AN ACT To present the steam launch Louise, now employed in the construction of the Panama Canal, to the French Government.

Be it enacted by the Senate and House of Representatives of the United State of America in Congress assembled, That, as a mark of appreciation of the sacrifices and services of the French people in the construction of the Panama Canal, the steam launch Louise, built in France in eighteen hundred and eighty-five, and employed in the construction of the canal successively by the French Panama Canal Company and by the United States, be put in good condition and presented to the French Government.

Sec. 2. That the sum of $6.000 is hereby appropriated, out of any money in the Treasury not otherwise appropriated, to pay the expense of executing this Act, to be disbursed by the Governor of the Canal Zone.

Approved, August 25, 1914.

AN ACT To provide for the registration of, with collectors of internal revenue, and to impose a special tax upon all persons who produce, import, manufacture, compound, deal in, dispense, sell, distribute, or give away opium or coca leaves, their salts, derivatives, or preparations, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United State of America in Congress assembled, That on and after the first day of March, nineteen hundred and fifteen, every person who produces, imports, manufactures, compounds, deals in, dispenses, sells, distributes, or gives away opium or coca leaves or any compound, manufacture, salt, derivative, or preparation thereof, shall register with the collector of internal revenue of the district his name or style, place of business, and place or places where such business is to be carried on: *Provided,* That the office, or if none, then the residence of any person shall be considered for the purposes of this Act to be his place of business. At the time of such registry and on or before the first day of July, annually thereafter, every person who produces, imports, manufactures, compounds, deals in, dispenses, sells, distributes, or gives away any of the aforesaid drugs shall pay to the said collector a special tax at the rate of $1 per annum: *Provided,* That no employee of any person who produces, imports, manufactures, compounds, deals in, dispenses, sells, distributes, or gives any of the aforesaid drugs, acting within the scope of his employment, shall be required to register or to pay the special tax provided by this section: *Provided further*, That the person who employs him shall have registered and paid the special tax as required by this section: *Provided further*, That officers of the United States Government who are lawfully engaged in making purchases of the above-named drugs for the various departments of the Army and Navy, the Public Health Service, and for Government hospitals and prisons, and officers of any State government, or of any county or municipality therein, who are lawfully engaged in making purchases of the above-named drugs for State, county, or municipal hospitals or prisons, and officials of any Territory or insular possession or the District of Columbia or of the United States who are lawfully engaged in making purchases of the above-named drugs for hospitals or prisons therein shall not be required to register and pay the special tax as herein required.

It shall be unlawful for any person required to register under the terms of this Act to produce, import, manufacture, compound, deal in, dispense, sell, distribute, or give away any of the aforesaid drugs without having registered and paid the special tax provided for in this section.

That the word "person" as used in this Act shall be construed to mean and include a partnership, association, company, or corporation, as well as a natural person; and all provisions of existing law relating to special taxes, so far as applicable, including the provisions of section thirty-two hundred and forty of the Revised Statutes of the United States are hereby extended to the special tax herein imposed.

That the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall make all needful rules and regulations for carrying the provisions of this Act into effect.

Sec. 2. That it shall be unlawful for any person to sell, barter, exchange, or give away any of the aforesaid drugs except in pursuance of a written order of the person to whom such article is sold, bartered, exchanged, or given, on a form to be issued in blank for that purpose by the Commissioner of Internal Revenue. Every person who shall accept any such order, and in pursuance thereof shall sell, barter, exchange, or give away any of the aforesaid drugs, shall preserve such order for a period of two years in such a way as to be readily accessible to inspection by any officer, agent, or employee of the Treasury Department duly authorized for that purpose, and the State, Territorial, District, municipal, and insular officials named in section five of this Act. Every person who shall give an order as herein provided to any other person for any of the aforesaid drugs shall, at or before the time of giving such order, make or cause to be made a duplicate thereof on a form to be issued in blank for that purpose by the Commissioner of Internal Revenue, and in case of the acceptance of such order, shall preserve such duplicate for said period of two years in such a way as to be readily accessible to inspection by the officers, agents, employees, and officials hereinbefore mentioned. Nothing contained in this section shall apply—

(a) To the dispensing or distribution of any of the aforesaid drugs to a patient by a physician, dentist, or veterinary surgeon registered under this Act in the course of his professional practice only: *Provided*, That such physician, dentist, or veterinary surgeon shall keep a record of all such drugs dispensed or distributed, showing the amount dispensed or distributed, the date, and the name and address of the patient to whom such drugs are dispensed or distributed, except such as may be dispensed or distributed to a patient upon whom such physician, dentist or veterinary surgeon shall personally attend; and such record shall be kept for a period of two years from the date of dispensing or distributing such drugs, subject to inspection, as provided in this Act.

(b) To the sale, dispensing, or distribution of any of the aforesaid drugs by a dealer to a consumer under and in pursuance of a written prescription issued by a physician, dentist, or veterinary surgeon registered under this Act: *Provided, however*, That such prescription shall be dated as of the day on which signed and shall be signed by the physician, dentist, or veterinary surgeon who shall have issued the same: *And provided further*, That such dealer shall preserve such prescription for a period of two years from the day on which such prescription is filled in such a way as to be readily accessible to inspection by the officers, agents, employees, and officials hereinbefore mentioned.

(c) To the sale, exportation, shipment, or delivery of any of the aforesaid drugs by any person within the United States or any Territory or the District of Columbia or any of the insular possessions of the United States to any person in any foreign country, regulating their entry in accordance with such regulations for importation thereof into such foreign country as are prescribed by said country, such regulations to be promulgated from time to time by the Secretary of State of the United States.

(d) To the sale, barter, exchange, or giving away of any of the aforesaid drugs to any officer of the United States Government or of any State, territorial, district, county, or municipal or insular government lawfully engaged in making purchases thereof for the various departments of the Army and Navy, the Public Health Service, and for Government, State, territorial district, county, or municipal or insular hospitals or prisons.

The Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall cause suitable forms to be prepared for the purposes above mentioned, and shall cause the same to be distributed to collectors of internal revenue for sale by them to those persons who shall have registered and paid the special tax as required by section one of this Act in their districts, respectively; and no collector shall sell any of such forms to any persons other than a person who has registered and paid the special tax as required by section one of this Act in his district. The price at which such forms shall be sold by said collectors shall be fixed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, but shall not exceed the sum of $1 per hundred. Every collector shall keep an account of the number of such forms sold by him, the names of the purchasers, and the number of such forms sold to each of such purchasers. Whenever any collector shall sell any of such forms, he shall cause the name of the purchaser thereof to be plainly written or stamped thereon before delivering the same; and no person other than such purchaser shall use any of said forms bearing the name of such purchaser for the purpose of procuring any of the aforesaid drugs, or furnish any of the forms bearing the name of such purchaser to any person with intent thereby to procure the shipment or delivery of any of the aforesaid drugs. It shall be unlawful for any person to obtain by means of said order forms any of the aforesaid drugs for any purpose other than the use, sale, or distribution thereof by him in the conduct of a lawful business in said drugs or in the legitimate practice of his profession.

The provisions of this Act shall apply to the United States, the District of Columbia, the Territory of Alaska, the Territory of Hawaii, the insular possessions of the United States, and the Canal Zone. In Porto Rico and the Philippine Islands the administration of this Act, the collection of the said special tax, and the issuance of the order forms specified in section two shall be performed by the appropriate internal-revenue officers of those governments, and all revenues collected hereunder in Porto Rico and the Philippine Islands shall accrue intact to the general governments thereof, respectively. The courts of first instance in the Philippine Islands shall possess and exercise jurisdiction in all cases arising under this Act in said islands. The President is authorized and directed to issue such Executive orders as will carry into effect in the Canal Zone the intent and purpose of this Act by providing for the registration and the imposition of a special tax upon all persons in the Canal Zone who produce, import, compound, deal in, dispense, sell, distribute, or give away opium or coca leaves, their salts, derivatives, or preparations.

Sec. 3. That any person who shall be registered in any internal-revenue district under the provisions of section one of this Act shall, whenever required so to do by the collector of the district, render to the said collector a true and correct statement or return, verified by affidavit, setting forth the quantity of the aforesaid drugs received by him in said internal-revenue district during such period immediately preceding the demand of the collector, not exceeding three months, as the said collector may fix and determine; the names of the persons from whom the said drugs were received; the quantity in each instance received from each of such persons, and the date when received.

Sec. 4. That it shall be unlawful for any person who shall not have registered and paid the special tax as required by section one of this Act to send, ship, carry, or deliver any of the aforesaid drugs from any State or Territory or the District of Columbia, or any insular possession of the United States, to any person in any other State or Territory or the District of Columbia or any insular possession of the United States: *Provided*, That nothing contained in this section shall apply to common carriers engaged in transporting the aforesaid drugs, or to any employee acting within the scope of his employment, of any person who shall have registered and paid the special tax as required by section one of this Act, or to any person who shall deliver any such drug which has been prescribed or dispensed by a physician, dentist, or veterinarian required to register under the terms of this Act, who has been employed to prescribe for the particular patient receiving such drug, or to any United States, State, county, municipal, District, Territorial, or insular officer or official acting within the scope of his official duties.

SEC. 5. That the duplicate-order forms and the prescriptions required to be preserved under the provisions of section two of this Act, and the statements or returns filed in the office of the collector of the district, under the provisions of section three of this Act, shall be open to inspection by officers, agents, and employees of the Treasury Department duly authorized for that purpose; and such officials of any State or Territory, or of any organized municipality therein, or of the District of Columbia, or any insular possession of the United States, as shall be charged with the enforcement of any law or municipal ordinance regulating the sale, prescribing, dispensing, dealing in, or distribution of the aforesaid drugs. Each collector of internal revenue is hereby authorized to furnish, upon written request, certified copies of any of the said statements or returns filed in his office to any of such officials of any State or Territory or organized municipality therein, or the District of Columbia, or any insular possession of the United States, as shall be entitled to inspect the said statements or returns filed in the office of the said collector, upon the payment of a fee of $1 for each one hundred words or fraction thereof in the copy or copies so requested. Any person who shall disclose the information contained in the said statements or returns or in the said duplicate-order forms, except as herein expressly provided, and except for the purpose of enforcing the provisions of this Act, or for the purpose of enforcing any law of any State or Territory or the District of Columbia, or any insular possession of the United States, or ordinance of any organized municipality therein, regulating the sale, prescribing, dispensing, dealing in, or distribution of the aforesaid drugs, shall, on conviction, be fined or imprisoned as provided by section nine of this Act. And collectors of internal revenue are hereby authorized to furnish upon written request, to any person, a certified copy of the names of any or all persons who may be listed in their respective collection districts as special-tax payers under the provisions of this Act, upon payment of a fee of $1 for each one hundred names or fraction thereof in the copy so requested.

SEC. 6. That the provisions of this Act shall not be construed to apply to the sale, distribution, giving away, dispensing, or possession of preparations and remedies which do not contain more than two grains of opium, or more than one-fourth of a grain of morphine, or more than one-eighth of a grain of heroin, or more than one grain of codeine, or any salt or derivative of any of them in one fluid ounce, or, if a solid or semisolid preparation, in one avoirdupois ounce; or to liniments, ointments, or other preparations which are prepared for external use only, except liniments, ointments, and other preparations which contain cocaine or any of its salts or alpha or beta eucaine or any of their salts or any synthetic substitute for them: *Provided*, That such remedies and preparations are sold, distributed, given away, dispensed, or possessed as medicines and not for the purpose of evading the intentions and provisions of this Act. The provisions of this Act shall not apply to decocainized coca leaves or preparations made therefrom, or to other preparations of coca leaves which do not contain cocaine.

SEC. 7. That all laws relating to the assessment, collection, remission, and refund of internal-revenue taxes, including section thirty-two hundred and twenty-nine of the Revised Statutes of the United States, so far as applicable to and not inconsistent with the provisions of this Act, are hereby extended and made applicable to the special taxes imposed by this Act.

SEC. 8. That it shall be unlawful for any person not registered under the provisions of this Act, and who has not paid the special tax provided for by this Act, to have in his possession or under his control any of the aforesaid drugs; and such possession or control shall be presumptive evidence of a violation of this section, and also of a violation of the provisions of section one of this Act: *Provided*, That this section shall not apply to any employee of a registered person, or to a nurse under the supervision of a physician, dentist, or veterinary surgeon registered under this Act, having such possession or control by virtue of his employment or occupation and not on his own account; or to the possession of any of the aforesaid drugs which has or have been prescribed in good faith by a physician, dentist, or veterinary surgeon registered under this Act; or to any United States, State, county, municipal, District, Territorial, or insular officer or official who has possession of any said drugs, by reason of his official duties, or to a warehouseman holding possession for a person registered and who has paid the taxes under this Act; or to common carriers engaged in transporting such drugs: *Provided further*, That it shall not be necessary to negative any of the aforesaid exemptions in any complaint, information, indictment, or other writ or proceeding laid or brought under this Act; and the burden of proof of any such exemption shall be upon the defendant.

SEC. 9. That any person who violates or fails to comply with any of the requirements of this Act shall, on conviction, be fined not more than $2,000 or be imprisoned not more than five years, or both, in the discretion of the court.

SEC. 10. That the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, is authorized to appoint such agents, deputy collectors, inspectors, chemists, assistant chemists, clerks, and messengers in the field and in the Bureau of Internal Revenue in the District of Columbia as may be necessary to enforce the provisions of this Act.

SEC. 11. That the sum of $150,000, or so much thereof as may be necessary, be, and hereby is, appropriated, out of any moneys in the Treasury not otherwise appropriated, for the purpose of carrying into effect the provisions of this Act.

SEC. 12. That nothing contained in this Act shall be construed to impair, alter, amend, or repeal any of the privisions of the Act of Congress approved June thirtieth, nineteen hundred and six, entitled "An Act for preventing the manufacture, sale, or transportation of adulterated or misbranded, or poisonous, or deleterious foods, drugs, medicines, and liquors, and for regulating traffic therein, and for other purposes," and any amendment thereof, or of the Act approved February ninth, nineteen hundred and nine, entitled "An Act to prohibit the importation and use of opium for other than medicinal purposes," and any amendment thereof.

Approved, December 17, 1914.

AN ACT To authorize the Government Exhibit Board for the Panama-Pacific International Exposition to install any part or parts of the Government exhibit at the said exposition either in the exhibit palaces of the Panama-Pacific International Exposition Company or in the Government building at said exposition.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Government Exhibit Board, created by the sundry civil Act approved June twenty-third, nineteen hundred and thirteen, is hereby authorized to install, display, and maintain any part or parts of the exhibit of the United States Government at the Panama-Pacific International Exposition in the exhibit palaces provided by the Panama-Pacific International Exposition Company or in the Government building provided for in the sundry civil Act approved August first, nineteen hundred and fourteen, as the said Government Exhibit Board may determine.

Approved, January 11, 1915.

AN ACT For the coinage of certain gold and silver coins in commemoration of the Panama-Pacific International Exposition, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Treasury shall cause to be coined at the United States mint at San Francisco not exceeding three thousand gold coins of the denomination of $50 each, ten thousand gold coins of the denomination of $2.50 each, twenty-five thousand gold coins of the denomination of $1 each, and not exceeding two hundred thousand silver coins of the denomination of 50 cents each, all of legal weight and fineness; said coins to be struck in commemoration of the Panama-Pacific International Exposition. The words, devices, and designs upon said coins shall be determined and prescribed by the Secretary of the Treasury, and all provisions of law relative to the coinage and legal-tender value of all other gold and silver coins shall be applicable to the coins issued under and in accordance with the provisions of this Act; and one-half of the issue of $50 gold coins herein authorized shall be similar in shape to the octagonal $50 gold pieces issued in California in eighteen hundred and fifty-one; and the entire issue of said $50, $2.50, and $1 coins herein authorized shall be sold and delivered by the Secretary of the Treasury to the Panama-Pacific International Exposition Company at par, under rules and regulations and in amounts to be prescribed by him. The coinage shall be executed as soon as may be and the delivery of said coins to begin not later than the day of the opening of the exposition. Said 50-cent coins herein authorized shall be issued only upon the request of the Panama-Pacific International Exposition Company, and shall be delivered to it by the Secretary of the Treasury, at par, during the period when said Panama-Pacific International Exposition shall be officially open.

SEC. 2. That medals and diplomas, with appropriate devices, emblems, and inscriptions commemorative of said Panama-Pacific International Exposition and of the awards to be made to the exhibitors thereat, shall be prepared by the Secretary of the Treasury at the United States mint at Philadelphia and the Bureau of Engraving and Printing, said medals and diplomas to be delivered to said Panama-Pacific International Exposition Company subject to the provisions of section fifty-two of the coinage Act of eighteen hundred and seventy-three and upon payment of the cost of the material composing said medals or diplomas.

SEC. 3. That the 50-cent silver coins herein authorized may, in the discretion of the Secretary of the Treasury, be coined or finished and issued from the machinery to be installed as a part of the exhibit of the United States mint at said exposition, and for the purpose of maintaining the exhibit as an educative working exhibit at all times the coins so minted may be remelted and reminted. All of the said 50-cent silver coins herein authorized not issued to and at the request of said Panama-Pacific International Exposition, whether the same are coined as a part of said working exhibit or coined at the mint in San Francisco, shall be remelted upon the official closing of said exposition. All provisions hereof in regard to the coinage, finishing, or issue of said 50-cent silver coins from machinery installed as a part of the said exhibit shall be coined, finished, and issued under such regulations as the Secretary of the Treasury may prescribe; and the Secretary of the Treasury shall cause to be prepared a suitable souvenir medal (of such metal or composition of metals as he may prescribe), to be struck off by the machinery in said mint exhibit, and all of said metals shall be delivered to said Panama-Pacific International Exposition Company upon payment of the cost of the material composing the same, and all other souvenirs which may be coined, stamped, printed, or otherwise issued from any portion of the United States Government exhibit shall be delivered to said exposition company upon payment of the cost of the material composing said souvenirs, and said souvenir medals and other souvenirs shall be delivered to said Panama-Pacific International Exposition Company subject to such regulations as to disposition thereof as the Government exhibit board may prescribe. All provisions, whether penal or otherwise, of the laws prohibiting the counterfeiting or imitating of coins or securities of the United States shall apply to the medals, diplomas, and souvenirs provided for under sections two and three of this Act.

SEC. 4. That the Secretary of the Treasury is hereby authorized to obtain suitable designs for the coins and medals herein authorized, and the sum of $5,000, or so much thereof as may be necessary, is hereby appropriated, out of any money in the Treasury not otherwise appropriated, to defray the cost of said designs: Provided, That the Panama-Pacific International Exposition Company shall reimburse the Treasury Department for the amount thus expended.

Approved, January 16, 1915.

AN ACT Making appropriations to supply urgent deficiencies in appropriations for the fiscal year nineteen hundred and fifteen and prior years, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply urgent deficiencies in appropriations for the fiscal year nineteen hundred and fifteen and prior years, and for other purposes, namely:

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DEPARTMENT OF STATE.

Payment to Panama: To enable the Secretary of State to pay to the Government of Panama the third annual payment, due on February twenty-sixth, nineteen hundred and fifteen, from the Government of the United States to the Government of Panama under article fourteen of the treaty of November eighteenth, nineteen hundred and three, $250,000.

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PANAMA CANAL.

The balances of the appropriations heretofore made under the heading "Fortifications, Panama Canal," are hereby consolidated so as to constitute one fund in the Treasury, to be disbursed and accounted for under the appropriation title of "Panama fortifications" for the object specified in the several appropriation Acts and in accordance with such allotments as may be authorized by the Secretary of War.

Approved, January 25, 1915.

AN ACT To authorize aids to navigation and other works in the Lighthouse Service, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Commerce is hereby authorized to establish, provide, or improve the following aids to navigation and other works in the Lighthouse Service, under the Department of Commerce, in accordance with the respective limits of costs hereinafter respectively set forth, which shall in no case be exceeded.

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PANAMA CANAL.

Two lights on the Pacific coast, necessary as aids to navigation near the Pacific entrance to the Panama Canal, at a total cost not exceeding $48,000; one of them at Punta Mala, the other at Bona Island.

And for the construction of these two aids the Secretary of Commerce may, by satisfactory arrangement with the Governor of the Panama Canal, have them constructed and maintained through the Panama Canal force.

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Approved, March 3, 1915.

AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and sixteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, for the fiscal year ending June thirtieth, nineteen hundred and sixteen, namely:

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War Department.

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NATIONAL CEMETERIES.

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Disposition of remains of officers, soldiers, civilian employees, and so forth: For interment, or preparation and transportation to their homes or to such national cemeteries as may be designated by proper authority, in the discretion of the Secretary of War, of the remains of officers, including acting assistant surgeons, and enlisted men of the Army active list; interment, or preparation and transportation to their homes, of the remains of civil employees of the Army in the employ of the War Department who die abroad, in Alaska, in the Canal Zone, or on Army transports, or who die while on duty in the field or at military posts within the limits of the United States; interment of military prisoners who die at military posts; removal of remains from abandoned posts to permanent military posts or national cemeteries, including the remains of Federal soldiers, sailors, or marines, interred in fields or abandoned private and city cemeteries; and in any case where the expenses of burial or shipment of the remains of officers or enlisted men of the Army who die on the active list are borne by individuals, where such expenses would have been lawful claims against the Government, reimbursement to such individuals may be made of the amount allowed by the Government for such services out of this sum, but no reimbursement shall be made of such expenses incurred prior to July first, nineteen hundred and ten, $57,500.

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DEPARTMENT OF COMMERCE.

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COAST AND GEODETIC SURVEY.

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Field expenses: For surveys and necessary resurveys of the Atlantic and Gulf coasts of the United States, including the coasts of outlying islands under the jurisdiction of the United States: *Provided*, That not more than $25,000 of this amount shall be expended on the coasts of said outlying islands, and the Atlantic entrance to the Panama Canal, $65,000;

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THE PANAMA CANAL.

For every expenditure requisite for and incident to the construction, maintenance and operation, sanitation, and civil government of the Panama Canal and Canal Zone, including the following: Compensation of all officials and employees; foreign and domestic newspapers and periodicals; law books not exceeding $500, text books and books of reference; printing and binding, including printing of annual report, rents and personal services in the District of Columbia; purchase or exchange of typewriting, adding, and other machines; purchase or exchange, maintenance, repair, and operation of motor-propelled and horse-drawn passenger-carrying vehicles; claims for damages to vessels passing through the locks of the Panama Canal, as authorized by the Panama Canal Act; claims for losses of or damages to property arising from the conduct of authorized business operations; claims for damages caused to owners of private lands or private property of any kind by reason of the grants contained in the treaty between the United States and the Republic of Panama, proclaimed February twenty-sixth, nineteen hundred and four, or by reason of the operations of the United States, its agents or employees, or by reason of the construction, maintenance, operation, sanitation, and protection of the said canal or of the work of sanitation and protection therein provided for, whether such claims are compromised by agreement between the claimants and the Governor of the Panama Canal or allowed by a joint land commission; acquisition of land and land under water, as authorized in the Panama Canal Act; expenses incurred in assembling, assorting, storing, repairing, and selling material, machinery, and equipment heretofore or hereafter purchased or acquired for the construction of the Panama Canal which are unserviceable or no longer needed, to be reimbursed from the proceeds of such sales; expenses incident to conducting hearings and examining estimates for appropriations on the Isthmus; expenses incident to any emergency arising because of calamity by flood, fire, pestilence, or like character not foreseen or otherwise provided for herein; per diem allowance in lieu of subsistence when prescribed by the Governor of the Panama Canal, to persons engaged in field work or traveling on official business, pursuant to section thirteen of the sundry civil appropriation Act approved August first, nineteen hundred and fourteen, and for such other expenses not in the United States as the Governor of the Panama Canal may deem necessary to best promote the construction, maintenance, and operation, sanitation, and civil government of the Panama Canal, all to be expended under the direction of the Governor of the Panama Canal and accounted for as follows:

For continuing the construction and equipment of the Panama Canal, including $1,000 additional compensation to the Auditor for the War Department for extra services in auditing accounts for the Panama Canal, and not exceeding $40,000 for establishing two lights on the Pacific coast, necessary as aids to navigation near the Pacific entrance to the Panama Canal, one at Bona Island and one at Cape Mala, said lights to be established and maintained as a part of the lighting system of the Panama Canal, $10,500,000;

For maintenance and operation of the Panama Canal, salary of the Governor, $10,000; purchase, inspection, delivery, handling, and storing of material, supplies, and equipment for issue to all departments of the Panama Canal, the Panama Railroad, other branches of the United States Government, and for authorized sales, $5.200,000, together with all moneys arising from the conduct of business operations authorized by the Panama Canal Act;

For sanitation, quarantine, hospitals, and medical aid and support of the insane and of lepers, and aid and support of indigent persons legally within the Canal Zone, including expenses of their deportation when practicable, $700,000;

For civil government of the Panama Canal and Canal Zone, salaries of district judge, $6,000, district attorney, $5.000, marshal, $5,000, and for gratuities and necessary clothing for indigent discharged prisoners, $540,000;

In all, $16,940,000, the same to be immediately available and to continue available until expended: *Provided*, That all expenditures from the appropriations heretofore, herein, and hereafter made for the construction of the Panama Canal, including any portion of such appropriations which may be used for the construction of dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances, for the purpose of providing coal and other materials, labor, repairs, and supplies, for the construction of office buildings and quarters, and other necessary buildings, exclusive of fortifications and colliers, and exclusive of the amount used for operating and maintaining the canal, and exclusive of the amount expended for sanitation and civil government after January first, nineteen hundred and fifteen, may be paid from or reimbursed to the Treasury of the United States out of the proceeds of the sale of bonds authorized in section eight of the said Act approved June twenty-eighth, nineteen hundred and two, and section thirty-nine of the tariff Act approved August fifth, nineteen hundred and nine.

Except in cases of emergency, or conditions arising subsequent to and unforeseen at the time of submitting the annual estimates to Congress, and except for those employed in connection with the construction of permanent quarters, offices, and other necessary buildings, dry docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances for the purpose of providing coal and other materials, labor, repairs, and supplies, and except for the permanent operating organization under which the compensation of the various positions is limited by section four of the Panama Canal Act, there shall not be employed at any time during the fiscal year nineteen hundred and sixteen under any of the foregoing appropriations for the Panama Canal, any greater number of persons than are specified in the notes submitted respectively in connection with the estimates for each of said appropriations in the annual Book of Estimates for said year, nor shall there be paid to any such person during that fiscal year any greater rate of compensation than was authorized to be paid to persons occupying the same or like positions on the first day of July, nineteen hundred and fourteen; and all employments made or compensation increased because of emergencies or conditions so arising shall be specifically set forth, with the reasons therefor, by the governor in his report for the fiscal year nineteen hundred and sixteen.

In addition to the foregoing sums there is appropriated, for the fiscal year nineteen hundred and sixteen, for expenditure and reinvestment under the several heads of appropriation aforesaid without being covered into the Treasury of the United States, all moneys received by the Panama Canal from services rendered or materials and supplies furnished to the United States, the Panama Railroad Company, the Canal Zone government, or to their employees, respectively, or to the Panama Government; from hotel and hospital supplies and services; from rentals, wharfage, and like services; from labor, materials, and supplies and other services furnished to vessels other than those passing through the canal, and to others unable to obtain the same elsewhere; from the sale of scrap and other by-products of manufacturing and shop operations; from the sale of obsolete and unserviceable material, supplies, and equipment purchased or acquired for the operation, maintenance, protection, sanitation, and government of the canal and Canal Zone; and any net profits accruing from such business to the Panama Canal shall annually be covered into the Treasury of the United States.

In addition there is appropriated for the operation, maintenance, and extension of waterworks, sewers, and pavements in the cities of Panama and Colon, during the fiscal year nineteen hundred and sixteen, the necessary portions of such sums as shall be paid as water rentals or directly by the Government of Panama for such expenses.

FORTIFICATIONS, PANAMA CANAL.

For fortifications and armament thereof for the Panama Canal, to be immediately available and to continue available until expended, namely:

Electric light and power plants: For the purchase and installation of electric light and power plants for the seacoast fortifications on the Canal Zone, $3,081.

Searchlights: For the purchase and installation of searchlights for the seacoast fortifications on the Canal Zone, $79,666.

Clearings and trails: For maintenance of clearings and trails, $45,000.

For protection, preservation, and repair of the fortifications of the Panama Canal, including structures erected for torpedo defense, and for maintaining channels for access to torpedo wharves, $15,000.

For maintenance and repair of searchlights and electric light and power equipment for the fortifications of the Panama Canal, and for tools, electrical and other supplies, and appliances to be used in their operation, $7,500.

For reserve equipment for the fortifications of the Panama Canal, $50,000.

Where the expenses of persons engaged in field work or traveling on official business are chargeable to appropriations herein for fortifications or other works of defense for the Panama Canal, a per diem may be allowed in lieu of subsistence, pursuant to section thirteen of the sundry civil appropriation Act for the fiscal year nineteen hundred and fifteen.

For the purchase, manufacture, and test of ammunition for seacoast and land defense cannon, including the necessary experiments in connection therewith, and the machinery necessary for its manufacture at the arsenals, $733,000:

Provided, That if, in the opinion of the Secretary of War, it should be to the best interests of the United States, not to exceed $50,000 of the foregoing appropriation may be expended for the erection of a building at the Watertown Arsenal for the installation of machinery to be used in the manufacture of projectiles.

For the alteration, maintenance, and installation of the seacoast artillery, including the purchase and manufacture of machinery, tools, and materials necessary for the work, and expenses of civilian mechanics, and extra-duty pay of enlisted men engaged thereon, $30,000.

For alteration, maintenance, and repair of submarine mine matériel, $2,500;

Fire control: For the construction of fire-control stations and the purchase and installation of accessories therefor, $383,301.30;

For continuing the construction on the Panama Canal Zone of barracks, quarters, storehouses, and other buildings necessary for accommodating the mobile army and Coast Artillery troops to be stationed there, including water, sewer, and lighting systems, roads, walks, and so forth, and for repairing and remodeling existing buildings to render them suitable for sheltering troops, $1,290,000;

In all, specifically for fortifications and armament thereof for the Panama Canal, $2,639,048.30.

SEC. 2. No part of the money appropriated by this Act shall be used for payment of salaries or expenses of the Joint Land Commission, established under article fifteen of the treaty between the United States and the Republic of Panama, in adjudicating or settling any claim originating under any lease or contract for occupancy, made by the Panama Railroad Company in the Canal Zone, or for the payment of any awards made by said commission on account of any such claims.

SEC. 3. That in prescribing regulations under the provisions of section five of the sundry civil Act of August first, nineteen hundred and fourteen, the President shall provide that in lieu of furnishing to the auditor individual detail collection vouchers, not provided for in said regulations, two competent persons, one from the office of the Auditor for the War Department, designated by the auditor, and one from the office of the Comptroller of the Treasury, designated by the comptroller, shall be sent semiannually, at such time as may be designated by the comptroller, to the Canal Zone to examine the accounts and vouchers and verify the submitted schedules of collections and report in triplicate to the Auditor for the War Department, the Comptroller of the Treasury, and the auditor of the Panama Canal; and such persons shall make such other examination into the accounts of the Panama Canal as may be directed by the comptroller, and for all such purposes they shall have access to all records and papers pertaining thereto. Such examination and inspection shall be made for the period covered by the persons designated as soon as practicable, and the report of such persons shall be promptly filed. Such persons shall be furnished their transportation going and returning, including meals, and be paid a per diem of $4 from the day of sailing from the United States until return thereto, both days inclusive, in lieu of subsistence on the Isthmus and all other expenses, out of such appropriation for the Panama Canal as may be designated by the governor.

SEC. 4. That appropriations herein for printing and binding shall not be used for any annual report or the accompanying documents unless the copy therefor is furnished to the Public Printer in the following manner: Copies of the documents accompanying such annual reports on or before the fifteenth day of October of each year; copies of the annual reports on or before the fifteenth day of November of each year; and complete revised proofs of the accompanying documents and the annual reports on the tenth and twentieth days of November of each year, respectively. The provisions of this section shall not apply to the annual reports of the Smithsonian Institution, the Commissioner of Patents, or the Comptroller of the Currency.

SEC. 5. That no part of any money appropriated by this Act shall be used during the fiscal year nineteen hundred and sixteen for the purchase of any typewriting machine at a price in excess of the lowest price paid by the Government of the United States for the same make and substantially the same model of machine during the period of the fiscal years nineteen hundred and thirteen and nineteen hundred and fourteen; such price shall include the value of any typewriting machine or machines given in exchange, but shall not apply to special prices granted on typewriting machines used in schools of the District of Columbia or of the Indian Service.

SEC. 6. That all sums appropriated by this Act for salaries of officers and employees of the Government shall be in full for such salaries for the fiscal year nineteen hundred and sixteen, and all laws or parts of laws to the extent they are in conflict with the provisions of this Act are repealed.

Approved, March 3, 1915.

AN ACT Making appropriations for the naval service for the fiscal year ending June thirtieth, nineteen hundred and sixteen, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, to be paid out of any money in the Treasury not otherwise appropriated, for the naval service of the Government for the year ending June thirtieth, nineteen hundred and sixteen, and for other purposes:

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PUBLIC WORKS, BUREAU OF YARDS AND DOCKS.

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That the appropriation of $400,000 for erection on the Isthmus of Panama of barracks, quarters, and other buildings for accommodation of marines, contained in the Act of March fourth, nineteen hundred and thirteen, is hereby reappropriated, and $200,000 thereof made available for the erection of marine barracks at Mare Island, California and $200,000 thereof made available for the erection of marine barracks at Norfolk, Virginia.

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BUREAU OF STEAM ENGINEERING.

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High-power radio stations: Toward the purchase and preparation of necessary sites, purchase and erection of towers and buildings, and the purchase and installation of machinery and apparatus of high-power radio stations (cost not to exceed $1,500,000), to be located as follows: One in the Isthmian Canal Zone, one on the California coast, one in the Hawaiian Islands, one in American Samoa, one on the island of Guam, and one in the Philippine Islands, $400,000, to be available until expended.

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Approved, March 3, 1915.

AN ACT To provide for recognizing the services of certain officers of the Army, Navy, and Public Health Service for their services in connection with the construction of the Panama Canal, to extend to certain of such officers the thanks of Congress, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the thanks of Congress are hereby extended to the following officers of the Army and Navy of the United States who, as members of the late Isthmian Canal Commission, have rendered distinguished service in constructing the Panama Canal, to wit: Colonel George W. Goethals, chairman and chief engineer; Brigadier General William C. Gorgas, sanitary expert; Colonel H. F. Hodges, Lieutenant Colonel William L. Sibert, and Commander H. H. Rousseau.

Sec. 2. That the President is hereby authorized, by and with the advice and consent of the Senate, to advance in rank Colonel George W. Goethals to the grade of major general of the line, United States Army; Brigadier General William C. Gorgas to the rank of major general in the Medical Department, United States Army; Colonel H. F. Hodges and Lieutenant Colonel William L. Sibert to the grade of brigadier general of the line, United States Army; and Commander H. H. Rosseau to the grade of rear admiral of the lower Nine, United States Navy.

Sec. 3. That such officers of the Army and Navy as were detailed for duty with the Isthmian Canal Commission on the Isthmus of Panama for more than three years, and who shall not have been advanced in rank by any other provision of this bill, shall be advanced one grade in rank upon retirement: *Provided,* That any officer of the Army or Navy now on the retired list with similar service shall be immediately advanced one grade in rank on the retired list of the Army or Navy.

Sec. 4. That the President is further authorized, by and with the advice and consent of the Senate, to appoint such officers of the Public Health Service as were detailed for duty with the Isthmian Canal Commission on the Isthmus of Panama for more than three years to the grade next above that at present held by such officers.

Sec. 5. That the numbers in such grades provided for in sections two and four of this Act, except where vacancies occurring in any grade by the provisions of this Act can be filled by such officers in a lower grade as are entitled to the benefits of this Act, shall be temporarily increased during the time such offices may be held: *Provided,* That the officer who may be advanced and appointed major general in the Medical Department, United States Army, shall thereupon become the head of such department, and the operation of so much of section twenty-six of the Act of February second, nineteen hundred and one, as limits the term of office of the head of the Medical Department, United States Army, shall be suspended during the incumbency of the head of the department who may be appointed under this Act: *Provided,* That whenever the head of the Medical Department appointed under the provisions of this Act shall become separated from the active list of the Army, by retirement or otherwise, the extra office or grade to which he shall have been so advanced or appointed shall cease and determine, and thereafter the rank of the head of the Medical Department, United States Army, shall be that of a brigadier general: *Provided further,* That nothing in this Act shall operate to interfere with or retard the promotion to which any officer would be entitled under existing law: *And provided further,* That the officers advanced to higher grades under this Act shall be junior to the officers who now rank them under existing law when these officers have reached the same grade.

Sec. 6. That at any time after the passage of this Act any officer of the Army or Navy to be benefited by the provisions of this Act may, on his own application, be retired by the President at seventy-five per centum of the pay of the rank upon which he is retired.

Approved, March 4, 1915.

AN ACT Making appropriations for the support of the Army for the fiscal year ending June thirtieth, nineteen hundred and sixteen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, appropriated, out of any money in the Treasury not otherwise appropriated, for the support of the Army for the year ending June thirtieth, nineteen hundred and sixteen.

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Provided further, That on and after October first, nineteen hundred and fifteen, no officer or enlisted man of the Army shall, except upon his own request, be required to serve in a single tour of duty for more than two years in the Philippine Islands, nor more than three years in the Panama Canal Zone, except in case of insurrection or of actual or threatened hostilities.

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HOSPITAL CARE, CANAL ZONE GARRISONS: For paying the Panama Canal such reasonable charges, exclusive of subsistence, as may be approved by the Secretary of War for caring in its hospitals for officers, enlisted men, military prisoners, and civilian employees of the Army admitted thereto upon the request of proper military authority: *Provided,* That the subsistence of the said patients, except commissioned officers and acting dental surgeons, shall be paid to said hospitals out of the appropriation for subsistence of the Army at the rates provided therein for commutation of rations for enlisted patients in general hospitals, $45,000.

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Approved, March 4, 1915.

AN ACT Making appropriations for the Diplomatic and Consular Service for the fiscal year ending June thirtieth, nineteen hundred and sixteen.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and they are hereby, severally appropriated, in full compensation for the Diplomatic and Consular Service for the fiscal year ending June thirtieth, nineteen hundred and sixteen, out of any money in the Treasury not otherwise appropriated, for the objects hereinafter expressed, namely:

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RELIEF AND PROTECTION OF AMERICAN SEAMEN.

Relief and protection of American seamen in foreign countries, and shipwrecked American seamen in the Territory of Alaska, in the Hawaiian Islands, Porto Rico, the Panama Canal Zone, and the Philippine Islands, $20,000.

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EXPOSITION IN CITY OF PANAMA.

That the President be, and he is hereby, authorized to accept an invitation extended by the Government of Panama to the Government of the United States to participate in an exposition to be held in the city of Panama; and the sum of $25,000 be, and the same is hereby, appropriated, out of any money in the Treasury not otherwise appropriated, to enable suitable participation in said exposition by this country, for an appropriate exhibit of the arts, industries, manufactures, products of the soil, mines, and waters of the United States, and, as far as practicable, of the functions of the General Government, and an exhibit of such other articles as the President may direct, including an exhibit relating to the Panama Canal.

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Approved, March 4, 1915.

AN ACT Making appropriations to supply deficiencies in appropriations for the fiscal year nineteen hundred and fifteen and for prior years, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, to supply deficiencies in appropriations for the fiscal year nineteen hundred and fifteen and for prior years, and for other purposes, namely:

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WAR DEPARTMENT.

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MEDICAL DEPARTMENT.

Hospital care, Canal Zone garrisons: For paying the Panama Canal such reasonable charges, exclusive of subsistence, as may be approved by the Secretary of War for caring in its hospitals for officers, enlisted men, military prisoners, and civilian employees of the Army admitted thereto upon the request of proper military authority, $45,000: *Provided*, That the subsistence of the said patients, except commissioned officers and acting dental surgeons, shall be paid to said hospitals out of the appropriations for subsistence of the Army at the rates provided therein for commutation of rations for enlisted patients in general hospitals: *Provided further*, That of this sum $2,000 shall be available to pay the canal for similar services rendered during the month of June, nineteen hundred and fourteen.

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Approved, March 4, 1915.

AN ACT To provide for provisional certificates of registry of vessels abroad, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That consular officers of the United States and such other persons as may from time to time be designated by the President for the purpose are hereby authorized to issue provisional certificates of registry to vessels abroad which have been purchased by citizens of the United States, including corporations, as defined in section forty-one hundred and thirty-two, Revised Statutes, as amended by the Panama Canal Act and the Act of August eighteenth, nineteen hundred and fourteen.

(*a*) Such a provisional certificate shall entitle the vessel to the privileges of a vessel of the United States in trade with foreign countries or with the Philippine Islands and the islands of Guam and Tutuila until the expiration of six months from its date or until ten days after the vessel's arrival at a port of the United States, whichever first happens, and no longer. On arrival at a port of the United States the vessel shall become subject to the laws relating to officers, inspection, and measurement, as amended by the Act of August eighteenth, nineteen hundred and fourteen.

(*b*) The Secretary of Commerce shall prescribe the conditions in accordance with which such provisional certificates shall be issued and the manner in which they shall be surrendered in exchange for certificates of registry at ports of the United States.

(*c*) The form of such provisional certificate shall be prescribed by the Commissioner of Navigation and shall include the name of the ship and of the master, time and place of purchase and names of purchasers, and the best particulars respecting her tonnage, build, description, and inspection or survey which the consular officer is able to obtain.

(*d*) Copies of such provisional certificates shall be forwarded as soon as practicable by the issuing officer to the Commissioner of Navigation.

SEC. 2. That section forty-one hundred and sixty-five of the Revised Statutes and section ten of the Act of March third, eighteen hundred and ninety-seven, entitled "An Act to amend the laws relating to navigation," are hereby repealed.

SEC. 3. That this Act shall take effect sixty days after the date of its passage.

Approved, March 4, 1915.

BOUNDARY CONVENTION BETWEEN THE UNITED STATES AND PANAMA, SIGNED AT PANAMA, SEPTEMBER 2, 1914; RATIFICATION ADVISED BY THE SENATE OCTOBER 22, 1914; RATIFIED BY THE PRESIDENT, JANUARY 4, 1915; RATIFIED BY PANAMA, FEBRUARY 8, 1915; RATIFICATIONS EXCHANGED AT PANAMA, FEBRUARY 11, 1915; PROCLAIMED, FEBRUARY 18, 1915.

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Whereas a Convention between the United States of America and the Republic of Panama defining the boundary line of the Panama Canal Zone, was concluded and signed by their respective Plenipotentiaries at the City of Panama on the second day of September, one thousand nine hundred and fourteen, the original of which Convention, being in the English and Spanish languages, is word for word as follows:

BOUNDARY CONVENTION.

Whereas, Gen. George W. Davis, then Governor of the Canal Zone, on behalf of the United States of America, and Messrs. Tomás Arias and Ramón Valdés López, then Secretary of Foreign Affairs and Attorney General, respectively, of the Republic of Panama, acting on behalf of that Republic, entered into an agreement on the 15th day of June, 1904, by the terms of which the Republic of Panama delivered over to the United States of America, the use, occupation, and control in perpetuity of the zone of land ten miles in width described and mentioned in articles II and III of the Canal Treaty between the United States of America and the Republic of Panama, dated November 18, 1903, and the boundary lines of said zone, as well as those of the cities of Panama and Colon and their adjacent harbors, were subsequently located upon the ground and monumented:

And, whereas, the President of the Republic of Panama, by decree number 46 of May 17, 1912, delivered over to the United States the use, occupation, and control of the areas of land to be covered by the waters of Lake Gatun and all that part of the shores of the lake up to an elevation of one hundred feet above sea level, in conformity with articles II and III of said Canal Treaty:

And whereas, since the promulgation of said decree of May 17, 1912, the United States, in conformity with the said articles of said Treaty, have taken over the use, occupation, and control of the islands in said Lake Gatun and the peninsulas bordering on said lake to which there is no access except from said lake or from lands within the jurisdiction of the Canal Zone;

Now, therefore, the Government of the United States and the Republic of Panama being desirous to establish permanently the boundary lines of the above-mentioned lands and waters so taken over by the United States, to that end have resolved to enter into the following agreement, for which purpose the President of the United States of America has commissioned His Excellency William Jennings Price, Envoy Extraordinary and Minister Plenipotentiary of the United States to the Government of Panama, and the President of the Republic of Panama has commissioned His Excellency Ernesto T. Lefevre, Secretary of State in the office of Foreign Affairs of the Republic of Panama, who, having exchanged their respective full powers, have entered into the following boundary convention:

I.

It is agreed that the boundary lines of the zone of land of ten miles in width described in article II of the said Canal Treaty shall remain as defined and established by the agreement of June the 15th, 1904, above mentioned, and subsequently located on the ground and monumented as shown by exhibit 'A" accompanying this Convention, with the modifications hereinafter set out in respect to the cities of Panama and Colon and their adjacent harbors.

II.

In conformity with articles II and III of said Treaty the rights of the United States to the use, occupation, and control of the areas to be covered by the waters of Gatun Lake and all that part of the shores of the lake up to an elevation of one hundred feet above mean sea level, and the islands in said lake, is hereby recognized, and in like manner the right of the United States to the use, occupation, and control of the peninsulas bordering on said lake to which there is no access except over lands of the Canal Zone or from the waters of Gatun Lake, is hereby recognized.

The one hundred feet contour line above referred to, as well as the peninsulas above mentioned, shall be conveniently monumented and marked upon the ground by the United States, with the intervention of a representative or representatives of the Republic of Panama designated for that purpose, and sketched upon a special map.

III.

It is agreed that the permanent boundary line between the City of Panama and the Canal Zone shall be as follows:

Beginning at a concrete monument located above high water mark on the shore of Panama Bay, south of the Balboa Road on the slope of the headland called "Punta Mala," and north thirty-two degrees and thirty minutes west (N. 32° 30′ W.) and one hundred and fifty (150) meters from about the center of an island called "Gavilan."

From the above concrete monument (marked "A" on the map) the boundary line runs north twenty degrees and two minutes east (N. 20° 2′ E.) six hundred and thirty-three and seven-tenths (633.7) meters to a concrete monument (marked "B" on the map) located at the intersection of the easterly line of the Zone Boundary road, and the northerly line of the road leading from Panama to Balboa; thence north thirty-six degrees and forty-two minutes east (N. 36° 42′ E.) nine hundred and sixty-six and eighty-five hundredths (966.85) meters to a concrete monument (marked "C" on the map) on the northerly side of the road leading to Ancon Hospital grounds; thence north three degrees and nineteen minutes east (N. 3° 19′ E.) one hundred and forty-eight and forty-six one-hundredths (148.46) meters to an iron rail property monument; thence north eight degrees and fourteen minutes, and forty seconds west (N. 8° 14′ 40″ W.) one hundred and fifty-one and thirty-three one-hundredths meters (151.33) to a point; thence north thirty-seven degrees and forty-five minutes east (N. 37° 45′ E.) fourteen and thirty-three one-hundredths meters to a point in the road on the present boundary line; thence along said present boundary north no degrees and forty-seven minutes west (N. 0° 47′ W.) sixty-six and forty-four one-hundredths meters (66.44) to a point; thence north seventy-six degrees and fifty-nine minutes east (N. 76° 59′ E.) forty-two and forty-five one-hundredths (42.45) meters to a point; thence south seventy-two degrees and eleven minutes east (S. 72° 11′ E.) one hundred and fifty-nine and twenty-seven one-hundredths (159.27) meters to a point near Calidonia Bridge; thence north three degrees and eight minutes east (N. 3° 8′ E.) crossing the Panama Railroad Company's tracks, seventy-seven and three-tenths (77.3) meters to a point twelve and two-tenths (12.2) meters from the center line of the main track of the said Panama Railroad; thence parallel to the said railroad in a north-westerly direction, two hundred and ninety and five-tenths (290.5) meters to a point on the present boundary line; thence north forty-nine degrees, thirteen minutes and ten seconds west (N. 49° 13′ 10″ W.) and one hundred and sixty-five and thirty-seven one-hundredths (165.37) meters to an iron rail monument, twelve and three-tenths meters from the center of the main line track of the Panama Railroad; thence north forty-six degrees, thirty-nine minutes and thirty seconds west (N. 46° 39′ 30″ W.) two hundred and twenty and four one-hundredths (220.04) meters to a Panama Railroad Boundary monument twenty-two and one-tenth (22.1) meters from the center line of Panama Railroad main line track; thence north forty-nine degrees and fourteen minutes west (N. 49° 14′ W.) and parallel with the Panama Railroad track two hundred and ninety and thirty-six one-hundredths (290.36) meters to Rio Curundu; thence following the course of Rio Curundu upstream to a point (marked "E" on the map) where the said Rio Curundu is intersected by a straight line drawn through the point of intersection on the canal axis (marked "Cocoli" on the map) perpendicular to that part of the Canal axis of A. D. 1906 which extends in a straight line southeasterly from the said point marked "Cocoli" to the point of intersection (marked "Bay" on the map) the former point of intersection being situated between Miraflores and Corozal, and the latter point in Ancon Harbor; thence from "E" north sixty-three degrees and thirty minutes east (N. 63° 30′ E.) two thousand and eight and six-tenths (2,008.6) meters to a concrete monument (marked "F" on the map) on the present boundary between the Canal Zone and the Republic of Panama; thence along this boundary south twenty-six degrees and thirty-four minutes east (S. 26° 34′ E.) about four thousand seven hundred and forty-four and five-tenths (4,744.5) meters to monument No. 99 and thence continuing on this line to the shore of Panama Bay at low water mark; thence following the mean low water line around the shore of Panama Bay to a point on the boundary line between Panama Harbor and Ancon Harbor; thence north seventy-two degrees, fourteen minutes west (N. 72° 14′ W.) to a monument "A," the point of beginning, except that the entire area of the middle island on the map called Las Tres Hermanas shall be under the jurisdiction of the United States of America.

Points "A," "B" and "C," above referred to, are the same points mentioned in the original agreement between the Government of the Republic of Panama and the Canal Zone Government, dated June 15, 1904.

All bearings in this description and on the map mentioned above are referred to true meridian and all coordinates are in accordance with the Panama-Colon Datum.

The Government of Panama agrees that the portion of the roadway now existing between the Ancon Post Office and the Tivoli Dispensary and connecting the Tivoli Road with the roads leading to Balboa and the Ancon Hospital grounds, which will fall within Panaman jurisdiction as a result of the boundary lines established in accordance with the foregoing description, will be kept open and of the same grade as same now is and will be maintained in good serviceable condition by the said Government of Panama so that it will afford a free, uninterrupted and unobstructed permanent public thoroughfare, unless in the future provided otherwise by the mutual agreement of the chief executive authorities of the Republic of Panama and the Panama Canal.

IV.

It is agreed that the harbor of the City of Panama shall include the maritime waters in front of the City of Panama lying to the north and east of a line beginning at a concrete monument set on "Punta Mala" marked "A" on the map already referred to in this Convention, and running south seventy-two degrees and fourteen minutes east (S. 72° 14′ E.) through the middle island of the three islands known as "Las Tres Hermanas," but excluding the said middle island, and extending three marine miles from mean low water mark at Punta Mala; and that the harbor of Ancon shall include the waters lying south and west of said line, but including the said middle island which shall be deemed to be within the harbor of Ancon. The said middle island hereby included within the harbor of Ancon is situated about south twelve degrees, thirty minutes west (S. 12° 30′ W.) eight hundred and fifty-six (856) meters from the point of Las Bovedas and lies in latitude north eight degrees fifty-six minutes (N. 8° 56′) plus one thousand and fifty-eight and eighty-eight hundredths (1,058.88) meters and longitude west seventy-nine degrees, thirty-two minutes (W. 79° 32′) plus three hundred forty-two and six-tenths (342.6) meters, the datum of said latitude and longitude being what is generally known as the Panama-Colon Datum. All bearings are referred to true meridian.

The foregoing description of the City of Panama and Panama Harbor conform to the accompanying blue print marked exhibit "B."

V.

It is agreed that the permanent boundary line between the City of Colon and the Canal Zone shall be as follows:

Beginning at a point on the western shore of Boca Chica (sometimes called Folks River) marked "A" on the map, and fifty (50) meters to the eastward of the center line of the main line of track of the Panama Railroad; thence northward and northwestward, always parallel with said railroad track, and at a uniform distance of fifty (50) meters from the center line thereof to the center of Bolivar Street (sometimes called "C" street), said point being marked "B" on the map; thence northerly along the center line of said Bolivar Street. to the center line of Eleventh Street, this point of intersection being marked

"C" on the map; thence westerly along the center line of Eleventh Street, a distance of one hundred sixty-two and fifty-three hundredths (162.53) meters to a cross on the sea wall along Limon Bay, said point being marked "D" on the map; thence north seventy-eight degrees, thirty minutes and thirty seconds west (N. 78° 30′ 30″ W.) to the shore of Limon Bay at mean low water mark; thence following the mean low water line around the shore in a northerly, easterly, southerly, and westerly direction to the point of beginning, except that at the site of the old Colon lighthouse a detour is made, as shown on the map, to exclude an area of land to be used as the site for a United States battery, which site shall be deemed to be within the Canal Zone.

The site for a United States battery above mentioned, which is to be included within the jurisdiction of the Canal Zone, is described as follows:

The initial point is a tack in a stake on Colon point, situated with reference to certain prominent points as follows: South forty-one degrees, six minutes east (S. 41° 6′ E.) twenty-five and twenty-two one-hundredths (25.22) feet from the southwest interior corner of the upper pavement of the swimming pool; south eleven degrees, thirty-seven minutes west (S. 11° 37′ W.) one hundred twenty-seven and sixty-eight one-hundredths (127.68) feet from a cross mark on a bolt set in a concrete base thirteen and nine-tenths (13.9) feet to the northeast of the center of the northeastern edge of the swimming pool; south thirty-five degrees, eighteen minutes west (S. 35° 18′ W.), two hundred sixty-six and seventy-five one-hundredths (266.75) feet from the northwestern corner of the Hotel Washington; and north sixty-eight degrees, twenty-nine minutes west (N. 68° 29′ W.), five hundred forty-three and ninety-five one-hundredths (543.95) feet from the cross mark on a rail set in a concrete base at a point where the south building line of Second Street intersects the center line of Bottle Alley; from this initial point south forty-three degree, no minutes west (S. 43° 00′ W.), two hundred fifty-eight and five-tenths (258.5) feet to a point; thence north forty-seven degrees, no minutes west (N. 47° 00′ W.) ninety and sixty-four one-hundredths (90.64) feet to a point; thence by a curve to the right with a radius of fifty-six and eighty-six one-hundredths (56.86) feet and a central angle of forty-five degrees, no minutes (45° 00′), forty-four and sixty-six one-hundredths (44.66) feet to a point; thence by a curve to the right with a radius of ninety-one (91) feet and a central angle of forty-five degrees, no minutes (45° 00′), seventy-one and forty-seven one-hundredths (71.47) feet to a point; thence north forty-three degrees, no minutes east (N. 43° 00′ E.), one hundred seventy-seven and five-tenths (177.5) feet to a point; thence south forty-seven degrees, no minutes east (S. 47° 00′ E.), one hundred fifty-seven and five-tenths (157.5) feet to the point of beginning, containing ninety-one one-hundredths (0.91) acres, more or less. All bearings are referred to true meridian (Panama-Colon Datum).

VI.

The harbor of Colon shall consist of those maritime waters lying to the westward of the City of Colon and bounded as follows:

The southerly boundary of the harbor of Colon is in a line running north seventy-eight degrees, thirty minutes and thirty seconds west (N. 78° 30′ 30″ W.), which begins at a cross cut in the concrete sea wall on the easterly side of Limon Bay and on the center line of Eleventh Street, Colon, produced westerly. This point is marked "D" on the map designated exhibit "C." Beginning at mean low water mark on Limon Bay on the above described line the boundary runs northwesterly along said line to a point in Limon Bay marked "E" on the map, and located three hundred and thirty (330) meters east of the center line of the Panama Canal; thence turning to the right and running in a northerly direction the line runs parallel with the above mentioned center line and at a distance of three hundred and thirty (330) meters easterly therefrom until it meets an imaginary straight line drawn through the lighthouse on Toro Point having a bearing of south seventy-eight degrees, thirty minutes and thirty seconds east (S. 78° 30′ 30″ E.), this intersection point being marked "F" on the map; thence turning to the right and running along the above-mentioned line south seventy-eight degrees, thirty minutes and thirty seconds east (S. 78° 30′ 30″ E.) to a point on the boundary of the above-mentioned site for the United States battery; thence turning to the right and running along the said boundary line of said site to the mean low water line of Limon Bay; thence turning to the right and running along said water line in a generally southerly direction to the point of beginning at the foot of Eleventh Street.

All bearings in this description and on the plan mentioned above are referred to true meridian (Panama-Colon Datum).

The foregoing description of the City of Colon and Colon Harbor conform to the accompanying blue print marked exhibit "C."

VII.

It is agreed that the Republic of Panama shall have an easement over and through the waters of the Canal Zone in and about Limon and Manzanillo bays to the end that vessels trading with the City of Colon may have access to and exit from the harbor of Colon, subject to the police laws and quarantine and sanitary rules and regulations of the United States and of the Canal Zone established for said waters.

The United States also agrees that small vessels may land at the east wall which extends along the shore to the south of the foot of Ninth Street and recently constructed by the Panama Railroad Company in the harbor of Colon free of any wharfage or landing charges that might otherwise accrue to the said company under the terms of its concessions from the Government of Colombia; and the United States further agrees that it will construct and maintain a landing pier in a small cove on the southerly side of Manzanillo Island in the northwesterly portion of the arm of the sea known as Boca Chica (sometimes called Folks River), to be used as a shelter harbor for small coasting boats of the Republic of Panama, without any wharfage or other landing charges.

VIII.

Inasmuch as the highway known as the "Sabanas Road" will come entirely within the bounds of the City of Panama under this agreement the authorities of the Canal Zone are hereby relieved of the duty to repair and maintain such road, or any part of it, and the same shall be done henceforth by the authorities of the Republic at their cost and expense.

IX.

It is agreed that the Republic of Panama will not construct nor allow the construction of any railway across the Sabanas or other territory hereby transferred to that Republic without a mutually satisfactory agreement having been previously arrived at between the two governments; and this shall be without prejudice to any right the United States may have to object to such railway projection under any of the provisions of the Canal Treaty of November 18, 1903.

X.

The contracting parties hereby agree that this Convention shall not diminish, exhaust, or alter any rights acquired by them heretofore in conformity with the Canal Treaty of November 18, 1903; and it is further expressly agreed that the United States, in the exercise of the rights granted to it under articles II and III of the said Canal Treaty and subject to article VI of said Treaty, may enter upon and use, occupy, and control the whole or any portion of the Sabanas land, or other territory hereby transferred to the Republic of Panama, as the same may be necessary, or convenient, for the construction, maintenance, operation, sanitation, or protection of the Canal or of any auxiliary canals, or other works necessary and convenient for the construction, maintenance, operation, sanitation, or protection of said enterprise.

XI.

This agreemet shall not be construed to modify the rights of the authorities of the Canal Zone to employ citizens of the Republic of Panama residing in the territory of the Republic as provided in section V of the above-mentioned agreement of June 15, 1904, and for which purpose the Government of the Republic granted the permission required by paragraph 2 of article 7 of the Panamanian

XII.

The civil and criminal cases pending in the courts of the Canal Zone and the Republic of Panama at the time of the execution of this Convention shall not be affected hereby but the same shall be proceeded with to final judgment and disposed of in the courts where they are now pending as though this agreement had not been entered into.

XIII.

The exhibits accompanying this agreement are signed by the representatives of the respective governments for identification. This Convention, when signed by the plenipotentiaries of the high contracting parties, will be ratified by the two governments in conformity with their respective constitutional laws, and the ratifications shall be exchanged at Panama at the earliest date possible.

In faith whereof the respective plenipotentiaries have signed the present Convention in duplicate and have hereunto affixed their respective seals.

Done at the City of Panama, the second day of September, in the year of our Lord, nineteen hundred and fourteen.

[SEAL.] WILLIAM JENNINGS PRICE.
[SEAL.] E. T. LEFÉVRE.

And whereas the said Convention has been duly ratified on both parts and the ratifications of the said Convention were exchanged in the City of Panama on the eleventh day of February, one thousand nine hundred and fifteen;

Now, therefore, be it known that I, Woodrow Wilson, President of the United States of America, have caused the said Convention to be made public to the end that the same and every article and clause thereof may be observed and fulfilled with good faith by the United States and the citizens thereof.

In testimony whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the City of Washington this eighteenth day of February in the year of our Lord one thousand nine hundred and fifteen, and of the Independence of the United States of America the one hundred and thirty-ninth.

[SEAL.] WOODROW WILSON.

By the President:
W. J. BRYAN,
Secretary of State.

EXECUTIVE ORDER.

Relating to Certain Duties of the Clerk of the District Court and his Assistant.

By virtue of the authority vested in me, I hereby establish the following Executive Order for the Canal Zone:

SECTION I. The Clerk of the District Court is ex officio Registrar of Property of the Canal Zone and, as such, is required to perform the duties heretofore exercised by, and imposed on the Registrar of Property, under preexisting laws of the Canal Zone; and the Assistant Clerk of the District Court shall have and exercise like powers in the name of his principal. The acts heretofore performed as Registrar of Property by the Clerk of the District Court, or by his Assistant, are hereby declared to be valid and binding.

SECTION II. The Clerk of the District Court, and his Assistant, are authorized to perform the duties heretofore imposed on the Clerks of the Circuit Courts of the Canal Zone, in respect to the issuing and recording of marriage licenses, and other matters relating thereto. All marriage licenses heretofore issued by the Clerk of the District Court, or by his Assistant, are hereby declared valid and binding.

SECTION III. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *3 July, 1914.*

[No. 1975.]

EXECUTIVE ORDER.

To Require Ocean-Going Vessels to be Fitted With Wireless Apparatus.

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone:

SECTION 1. From and after the first day of July, 1915, it shall be unlawful for any ocean-going steamer of the United States, or of any foreign country, carrying fifty or more persons, including passengers and crew, to leave or attempt to leave any prto of the Canal Zone unless such steamer shall be equipped with an efficient apparatus for radio communication in good working order in charge of a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages for a distance of at least one hunderd miles, night or day; provided that the provisions of this order shall not apply to steamers plying only between the Canal Zone and ports less than two hundred miles therefrom.

SECTION 2. The master or other person being in charge of such vessel which leaves or attempts to leave any port of the Canal Zone in violation of any of the provisions of this order shall, upon conviction, be fined in a sum not to exceed Five Thousand Dollars ($5,000.00), and any such fine shall be a lien upon such vessel, and the vessel may be liable therefor in the District Court of the Canal Zone, and the leaving or attempting to leave by any vessel from each and every port of the Canal Zone shall constitute a separate offense.

SECTION 3. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *9 July, 1914.*

[No. 1988.]

EXECUTIVE ORDER.

Authorizing the Board of Admeasurement to administer oaths to witnesses and to compel their attendance.

By virtue of authority vested in me, I hereby establish the following order for the Canal Zone:

SECTION 1. The Board of Admeasurement of the Canal Zone, and the respective members thereof, are hereby authorized to administer oaths to witnesses appearing before the Board, or before any member thereof, to testify in matters within the jurisdiction of the Board; and upon application to the District Judge the Board may obtain process to compel the attendance of witnesses and the production of books and papers. Any person who fails to obey the process of the Court, or who refuses to be sworn, or who refuses to answer any material or proper questions, after being duly sworn, shall be punished in the manner prescribed in the Penal Code for contempt of Court.

SECTION 2. This order shall take effect on and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *9 July, 1914.*

[No. 1989.]

EXECUTIVE ORDER.

Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, Including All Waters Under Its Jurisdiction.

GENERAL REGULATIONS.

1. The following Rules and Regulations pertaining to the Operation and Navigation of the Panama Canal are published for the benefit of all vessels coming within its jurisdiction, and masters of vessels, or their agents, one or both, desiring to use the Canal and terminal ports, or any of the waters, must observe them.

2. Any person violating any of the provisions of the rules and regulations established hereunder shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine of five hundred dollars ($500.00), or by imprisonment not to exceed six months, or by both such fine and imprisonment, at the discretion of the court.

3. After entering, no vessel shall leave one of the terminal ports for the purpose of passing further into the Canal until authority in proper form has been given by the Captain of the Port.

4. The Canal authorities may deny any vessel the privilege of passing through the Canal the cargo of which is of such a nature that it might, in any way, endanger the locks, wharves, equipment, or any part of the Canal, by being explosive or highly inflammable. The further right is reserved to them to impose such safety regulations as they may see fit upon any such vessel while in Canal waters.

5. Vessels desiring to pass through the Canal, whose cargoes consist of high explosives, should, when practicable, so report and obtain permission from the Canal authorities to use the Canal before leaving their ports of departure.

6. In any case where the condition of the cargo, hull, or machinery is such that it is liable to endanger or obstruct the Canal, permission to pass through may be refused until steps have been taken to remedy the defect.

7. All vessels having a specially dangerous cargo, such as explosives or oils of any kind, shall fly a red flag by day at the masthead and hoist a red lantern at night.

8. The following information must be ready for immediate delivery upon the arrival of the ship in port: name of vessel, nationality, name of master, date and time of arrival, port of departure, date of departure, port of destination, length, draft, beam, registered tonnage, crew and passenger list, and character of cargo; the bill of health should also be ready for presentation.

9. The Canal authorities may dispatch vessels through the Canal in any order and at any time they may see fit; priority of arrival at a terminal does not give any vessel the right to pass through the Canal ahead of another that may arrive later, although this will be a consideration in determining the order of passage.

10. The Canal authorities may hold a vessel for the purpose of investigating any report made against her by the proper persons, for the violation of the rules of the Canal or the laws of the Canal Zone, or of the United States, or for the investigation or adjustment of any claims or disputes that may arise on either side; but no vessel shall have any claim for damages against the Canal for any delay in consequence thereof.

PILOTS AND MOVEMENTS OF VESSELS.

11. Vessels will not be allowed to enter or depart from terminal ports between sundown and sunrise without having obtained permission from the proper authorities. This will not be interpreted to mean that a vessel in danger or distress will be prohibited from entering a terminal port at any time in case of necessity or emergency; but such vessel should, when practicable, give due notice in advance, by radio or otherwise, and obtain a pilot if possible; nor shall this be interpreted to prevent a vessel from anchoring just inside of the breakwater in the outer harbor at the Atlantic terminal, or to seaward of the entrance to the dredged channel on the Pacific side, between sundown and sunrise.

12. Except when exempted from the operation of this rule by the Governor of the Panama Canal, no vessel will be allowed to pass through the Canal, enter or leave a terminal port, maneuver, shift berth, go alongside of or leave any wharf or dock in Canal waters without having a regularly authorized Government pilot on board.

13. Pilotage for vessels in transit through the Canal will be free, nor will they be charged pilotage for entering or leaving a terminal port when it is for the sole purpose of passing through the Canal; but should any such vessel, while in Canal waters, discharge or receive freight or passengers, or take on board supplies, provisions, stores, or fuel, or remain for the purpose of effecting repairs, or make either terminal a port of call, she may be liable for entrance or departure pilotage, as the Canal authorities may direct.

14. Pilotage in and out of the Atlantic and Pacific terminals of the Canal is compulsory, and all vessels, unless otherwise exempted, will be compelled to take a regular Government pilot upon entering or leaving. The fact that the master or any officer of any vessel holds a pilot's license for any of the waters of the Canal Zone will not authorize the vessel to enter without taking a Government pilot.

15. No person, steamer, company, or corporation•will be allowed to maintain or employ pilots in Canal waters for the exclusive use of their own or any other vessels; all pilots, without exception, must be duly authorized and licensed by the Canal authorities and be in the employ of the Canal. This shall not be interpreted to mean that the Canal authorities shall be prohibited from issuing restricted pilot licenses for small craft in Canal waters, or any other that they may see fit.

16. Pilots will meet incoming vessels inside of the breakwaters at the Atlantic terminal and outside of the seaward end of the dredged channel at the Pacific terminal; should there be any delay, vessels may anchor just inside of the Atlantic breakwaters or to seaward of the Canal entrance on the Pacific side, make the usual signal for a pilot, and await his arrival. Should a vessel desire a pilot to meet her outside of the Atlantic breakwaters, she should remain there and make signal to this effect.

17. Whenever practicable, vessels should send notification of the probable time of their arrival, by radio or otherwise, so that pilots may meet them promptly.

18. All vessels entering port must take the berths or docks assigned them by the Captain of the Port, and they will not be allowed to shift berths or moorings without the proper permission.

19. Except in the prescribed limits in Gatun Lake and adjacent waters, no vessel will be allowed to anchor in any part of the Canal, nor on any of the marked ranges; should an emergency arise wherein it may be necessary to let go an anchor, whenever practicable the pilot should be consulted before doing so.

20. At all times when a vessel is under way in the terminal ports or in transit through the Canal, except while passing through the locks, with a duly accredited pilot on board, the captain or master of a vessel will be held solely responsible for the safety, handling, and proper navigation of the vessel; the pilot is to be considered as being on board solely in an advisory capacity, but masters of vessels must abide by the rules and regulations of the Canal, as interpreted to them by the pilots.

21. The pilot shall be freely consulted at all times to insure safety in navigation, and that no accident or damage result from ignorance on the part of the master or officers of the vessel in transit; and should any such master, officer, or person connected with the ship give, or cause to be given, any order, or direct any change of speed or direction of the ship on his own initiative, without the knowledge of the pilot, which may result in damage to his own or any other vessel, dredger, or property of any kind, or endanger or block the Canal, or any of its equipment, he will be held strictly responsible, and the vessel itself may be held by legal process until settlement in full shall have been made to cover any loss or damage that may have resulted in consequence thereof.

22. Inasmuch as every vessel has its own individual peculiarities in handling, answering her helm, variation in headway due to speed, it shall be the duty of the master of the vessel, or his qualified representative, to be present at all times on the bridge of the ship to keep the pilot informed in regard to these matters, so that the pilot may be best qualified to give advice in regard to navigating the ship safely.

23. The pilot should not only be freely consulted at all times on matters relating to the navigation of the ship, but to the rules and regulations pertaining to the same, to signals, locks, weather, or other matters of importance relating to the movements of the vessel. While on board he is the properly qualified representative of the Canal authorities in these matters, and should any accident or damage result from failure to consult him, or from not following his advice, the vessel shall be held responsible for such accident or damage.

24. The pilot must inform the master or captain that his (the pilot's) experience and knowledge of the Canal is at his (the master's or captain's) disposal, and that inasmuch as he (the pilot) is not in a position to know the defects, difficulties, or eccentricities of the vessel in maneuvering, while getting underway, or in transit, the responsibility for navigating the vessel is entirely in the hands of the master or captain, except when passing through the locks.

25. When in the opinion of the pilot, the master or captain, or their representatives, shall fail to follow his advice and thereby endanger his own or any other vessel, or any part of the Canal or its equipment, the pilot shall then direct the master or captain of such vessel to stop, anchor, or moor until the facts have been laid before the Canal authorities.

26. Pilots shall conform to such other rules as shall be prescribed for their guidance by the Governor of the Panama Canal.

PREPARATION FOR AND TRANSIT THROUGH THE CANAL.

27. Vessels shall, at all times, when under way in Canal waters, when passing through the locks, or moored temporarily in transit through the Canal, keep a full watch on deck and in the engine room, in the same manner in which they are kept at sea.

28. While a vessel is under way in Canal waters, no one shall be allowed on the bridge or in the pilot house except the pilot and other representatives of the Canal, the master and such officers and crew of the ship as may be necessary for her management, direction, and safety. Under no condition will any passenger or any other unauthorized person be allowed on the bridge or in the pilot house.

29. Before beginning the passage of the Canal, vessels will be required to have hawsers, lines, and fenders ready for passing through the locks, for warping, towing, or mooring, as the case may be, and will have both anchors ready for letting go. During the passage, at all times while the vessel is under way or moored against the lock walls, her deck winches, capstans, or other power for handling lines, as well as her mooring bits, deck chocks, cleats, hawse pipes, etc., shall be ready for handling ship to the exclusion of all other work.

30. At least one boat for handling lines shall be kept ready for lowering.

31. Should any part of a vessel's engines, machinery, condensers, boilers, shafts, propellers, steering gear, valves, hull, equipment, or anything else be in such condition that it might, through failure, interfere to prevent or retard a vessel's passage

through the Canal, such fact must be presented to the Captain of the Port before a vessel will be allowed to enter.

32. All sailing craft, vessels whose machinery may be in bad condition or disabled, and vessels without motive power, must be towed through all parts of the Canal lying between the entrances, for which service an additional charge will be imposed.

33. When passing through the locks, vessels will habitually be towed by Canal equipment. In exceptional instances, as when such equipment is not available, or in case of very small vessels, special permission to use the vessel's own motive power may be given by the Governor. Without such special permission, the vessel's motive power will not be used while passing the locks.

34. Upon approaching the lock, vessels will moor against the middle approach wall with the bow at least fifty feet from the nearest fender chain. They will then be taken in charge by the lock force and made ready for passage through the locks.

35. When these regulations are complied with in all respects, responsibility for handling vessels through the locks will rest with the Canal operating force, but the crew and officers will be required to render such assistance as may be necessary to supplement the lock force. To assist in insuring safety of passage, the lock force will take complete supervision of the engine room, even to the extent of sealing the engines if the Governor shall so direct.

36. The Governor of the Panama Canal is hereby authorized to issue from time to time orders regulating the procedure in passing vessels through the locks, and the details of the supervision which will be exercised by the lock force. Such orders when issued shall have the force of these regulations.

37. In cases where special permission to use the vessel's own motive power has been given by the Governor, he shall indicate what precautions must be taken to insure safety in passing through the locks. His directions as to such precautions must be observed strictly and in every detail.

38. Vessels will be liable for any damage to Canal structures or equipment while passing through the locks, caused through disregard or noncompliance of these rules and regulations or any orders which may be issued by the Governor to regulate such passage. The Panama Canal will not be held liable for any damage to the vessel occasioned by such disregard or noncompliance.

39. Masters of vessels will not allow anyone to take passage on their ships while passing through the Canal, except the ship's officers, crew, and duly accredited passengers, and such officials and other persons as may be designated by the Canal authorities.

RADIO COMMUNICATION AND REPORT.

40. As soon as radio communication can be established with the Canal, vessels should report their names, nationality, length, draft, tonnage, whether or not they desire to pass through the Canal, require coal, provisions, supplies, repairs, to go alongside of a wharf, the use of tugs, probable time of arrival, length of stay in port, or any other matters of importance or interest. If this information has been previously communicated, through agents or otherwise, to the Captain of the Port, it will not be necessary to report by radio; but the probable time of arrival should always be sent.

41. Control of radio communication is entirely in the hands of the radio shore stations. No vessel will be allowed to interfere in the slightest degree with the Canal radio stations; upon an order being received by a vessel at any time while within the waters under the control of the Canal to discontinue using radio, even if in the midst of transmission of a message, she shall immediately comply.

42. Upon a ship's arriving within the 15-mile limit, and until leaving the 15-mile limit of the Canal Zone, she shall transmit only with low power, not exceeding ½ K. W.

43. Messages to stations will be sent only to Colon station (NAX) when in Gatun locks and to northward thereof, and only to Balboa station (NPJ) when in Miraflores locks and to southward thereof; between these two points ships may work to either station, preferably to the nearer one; the high power station (Darien) at Radio, will not handle commercial work and will not be called for Canal business except in case of emergency.

44. All messages between ships in the Canal Zone and ships at sea must be forwarded through the nearer shore station.

45. Messages from ships in the Caribbean Sea for ships in the Pacific waters, or vice versa, shall be routed through the Canal Zone shore stations.

46. All vessels fitted with radio, after leaving the terminal harbor to pass through the Canal, shall keep an operator on watch until the further terminal harbor has been reached; this applies to the time when they are anchored in Gatun Lake, while passing through the locks, or moored to the lock walls, or to any of the wharves in the Canal

proper, as well as when they are under way. Messages relating to the ship's movements and the Canal business shall take precedence over all commercial messages.

47. Pilots on vessels passing through the Canal shall have the right to use a vessel's radio freely for the transaction of the Canal business.

48. Under the direction of the pilots, vessels will from time to time report their progress through the Canal; accidents to machinery, propellers, steering gear, equipment, or anything else that may delay them or require assistance; any sickness or casualties that require medical attendance from Canal officials; or any other matters of importance that may arise.

49. No charges will be imposed against the Canal by vessels receiving or sending messages in relation to Canal business.

50. No vessel will be allowed to communicate with any lock or signal station while in transit through the Canal, except through the pilot; all messages of any kind must be sent through him. This does not apply to vessels moored at the terminals at Cristobal or Balboa, before entering or after having passed through the Canal, which may wish to communicate through the terminal stations.

51. Vessels in transit through the Canal can communicate with the locks and signal stations, through the pilots, both by the international code and special signals; information on this subject may be obtained from the Governor of the Panama Canal.

ACCIDENTS OR DEFECTS.

52. If any defect in any part of a vessel's hull, machinery, steering gear, or equipment, be discovered while in transit through the Canal, of such a serious nature that it might interfere with the further passage of the vessel, or be liable to block the Canal, the vessel shall stop and, if practicable, be anchored or moored at the first available place. A full report shall immediately be made to the Superintendent of Transportation, through the Captain of the Port, stating fully the cause and nature of the trouble, probable delay, and request for assistance if it be necessary.

53. Under any and all circumstances, whenever a vessel is liable to become unmanageable from any weakness, or damage to her machinery, steering gear, or for any other reason, she shall immediately, through the pilot, request the assistance of a tug.

FIREARMS.

54. No firearms of any kind shall be discharged while in transit through the Canal or in Canal waters, and every precaution will be taken to prevent this.

SUBSISTENCE OF PILOTS.

55. Pilots and other authorized persons on duty, belonging to the Canal service, shall be subsisted without charge while on board vessels in transit through the Canal.

MAINTENANCE OF TUGS AND OTHER FLOATING EQUIPMENT.

56. No vessel, company, nor individual will be authorized to maintain or operate permanently any tugs, launches, lighters, or floating equipment of any kind within the Canal waters without permission from the Governor; nor shall any small craft or boat of any kind be operated without the proper authority from him.

CLAIMS.

57. All claims for damages arising from injury to vessels, cargo, or passengers from the passing of vessels through the locks under the control of those operating them in accordance with the rules and regulations governing the operation of the Panama Canal, shall be adjusted by mutual agreement when practicable, between the Panama Canal and the passengers, owners, agents or underwriters of the vessel, or owners agents or underwriters of the cargo of the vessel, as the respective interests may appear.

58. To facilitate the adjustment of such claims the Board of Local Inspectors, together with an officer or employee detailed from the Accounting Department to assist the Board, shall immediately proceed to investigate and report upon all accidents to vessels in the locks, which may result in claims for damages against the Panama Canal under the provisions of Section 5 of the Panama Canal Act.

59. The Board of Local Inspectors or any member thereof, acting for the Board, shall have authority to summon witnesses and administer oaths to such witnesses at any hearing held by such Board, and the attendance of witnesses may be compelled by process of court on application of the Board to the District Judge.

60. The findings of the Board shall be expressed in writing and reported to the Governor and a certified copy thereof immediately sent to the Auditor. If the finding of the Board is against the Panama Canal, the Auditor may proceed at once to effect a settlement with the claimants, if practicable, but such settlement shall be subject to the approval of the Governor. When the settlement is effected immediate payment of the claim shall be made, if there is an appropriation available for such purpose. In case of disagreement suit may be brought by the claimant in the District Court of the Canal Zone, against the Governor of the Panama Canal, in conformity with Section 5 of the Panama Canal Act.

61. The Governor of the Panama Canal is authorized to issue such detailed rules, not inconsistent with this order, governing the duties of the Board and the adjustment of claims.

MEASUREMENT OF VESSELS.

62. The rules for the measurement of vessels, to determine their tonnage, will be found in the proclamation of the President dated November 21, 1913.

AIDS TO NAVIGATION.

63. In general, the channels of the Canal, except Culebra Cut, are marked by double ranges, which are set a little to the starboard side of the channel, so that no matter in which direction a vessel may be going, there will be a range available ahead.

64. The sides of the channels are marked by red and black buoys, in accordance with the system in vogue in the United States, with the red buoys on the starboard hand on entering from seaward, and the black buoys on the port. The lock at Pedro Miguel is the dividing line between the Altantic and Pacific systems; that is to say, that after passing through the locks, red and black buoys will be found on the opposite sides of the channels to those on which they were before reaching the locks.

65. All lighted ranges show flashing or intermittent white lights; the red lighted buoys show flashing or intermittent red lights; the black lighted buoys show flashing or intermittent white lights; beacons show red or white flashing or intermittent lights, depending upon the side of the channel upon which they are situated. Further information in regard to the navigation of the Canal can be obtained upon application to the Superintendent of Transportation or the Captains of the Ports.

RULES OF THE ROAD, WHISTLE AND OTHER SIGNALS, AND SPEED REGULATIONS RELATING TO THE NAVIGATION OF THE CANAL AND APPROACHES THERETO.

66. In the following rules every steam vessel which is under sail and not under steam is considered a sailing vessel; and every vessel under her own motive power, whether under sail or not, is to be considered a steam vessel.

67. The words "steam vessel" and "steamer" shall include every vessel propelled by machinery.

68. A vessel is under way, within the meaning of these rules, when she is not at anchor, moored, or aground.

69. Risk of collision can, when circumstances permit, be determined by carefully watching the bearings of an approaching vessel by compass, or otherwise; if the courses be converging and the bearing does not appreciably change, such risk should be deemed to exist.

70. A steam vessel shall be provided with an efficient whistle or siren, sounded by sound or some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and a sailing vessel with an efficient fog horn; both shall be supplied with an efficient bell.

71. A sailing vessel of twenty tons gross tonnage or upward shall be provided with a similar fog horn and bell.

72. Motor boats shall be divided into classes as follows, according to the length, which shall be measured from end to end:

Class I. Less than 26 feet.
Class II. 26 feet or over, but less than 40 feet.
Class III. 40 feet or over, but less than 65 feet.

73. All motor boats shall be provided with a whistle or other mechanical sound-producing device, capable of making a blast of at least two seconds' duration, and in addition, classes II and III shall be provided with an efficient fog horn and fog bell, the latter to be at least eight inches across the mouth.

74. A short blast of the whistle shall mean a blast of about one second's duration, and a prolonged blast of the whistle shall mean a blast of from four to six seconds' duration.

75. One short blast of the whistle signifies intention of or assent to steamer first giving the signal to direct course to her own starboard, except when two steamers are approaching each other at right angles or obliquely, when it signifies intention of steamer which is to starboard of the other to hold course and speed.

76. Two short blasts of the whistle signify intention of or assent to steamer first giving the signal to direct course to her own port, except when steamers are approaching each other at right angles or obliquely, when the signal signifies desire of or assent to steamer which is to the port of the other to cross the bow of the steamer to starboard.

77. Three short blasts of the whistle shall mean: "My engines are going at full speed astern."

78. When vessels are in sight of one another a steam vessel under way whose engines are going at full speed astern shall indicate that fact by three short blasts of the whistle.

79. If, when vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by making the danger signal, namely: several short and rapid blasts, not less than four, on the steam whistle.

80. Whenever the danger signal is given, the engines of both steamers shall be stopped and backed until the headway of the steamers has been fully checked; nor shall the engines of either steamer be again started ahead until the steamers can safely pass each other, and the proper signals for passing have been given, answered, and understood.

81. Steam vessels are forbidden to use what has become technically known among pilots as "cross signals"; that is, answering one whistle with two, and answering two whistles with one. In all cases, and under all circumstances, a pilot receiving either of the whistle signals provided in these rules, which for any reason he deems injudicious to comply with, instead of answering it with a cross signal, shall at once sound the danger signal and observe the rule applying thereto.

82. The signals for passing, by blowing the whistle, shall be given and answered by vessels, in compliance with these rules, not only when meeting head on, or nearly so, but at all times when the vessels are in sight of each other, when passing or meeting at a distance within a half mile of each other, and whether passing to starboard or port.

83. The whistle signals provided in the rules for steam vessels meeting, passing, or overtaking, are never to be used except when steamers are in sight of each other, and the course and position of each can be determined in the daytime by a sight of the vessel itself, or at night by seeing its signal lights, except in cases hereafter mentioned, where vessels are approaching a turn in the Canal. In fog, mist, or heavy rainstorms, when vessels can not see each other, fog signals only must be given.

84. When steam vessels are approaching each other head on, or nearly so, it shall be the duty of each to pass on the port side of the other; and either vessel shall give, as a signal of her intention, one short and distinct blast of her whistle, and thereupon they shall pass upon the port side of each other. But if their courses be so far to starboard of each other as not to be considered as meeting head on, either vessel shall immediately give two short, distinct blasts of her whistle, which the other vessel shall answer promptly with two similar blasts, and they shall pass to starboard of each other; but vessels going in opposite directions, in transit through the Canal, shall make it an invariable rule to pass to port of each other, unless there be some special reason to the contrary.

85. When they sight each other in the straight reaches of the Canal, going in opposite directions, they shall, when within a mile of each other, be slowed down and each placed upon its respective range, which is marked by the two light towers to the starboard side of the middle line, and should not be allowed to approach closer than this to the center line until they have passed each other; this will obviate any risk of collision and prevent a vessel from approaching too close to the sides of the Canal.

86. Self-propelling Canal craft, at work on their stations or under way, will give way and leave the center of the channels clear to seagoing vessels in transit; nothing in this rule shall be construed to warrant a violation of the rules of the road, but shall be interpreted to mean that tugs, launches, and small self-propelling craft shall keep close to the sides of the Canal and out of mid-channel when large vessels are passing, whenever practicable, without involving any danger to themselves.

87. The foregoing applies only to cases where vessels are meeting end on, or nearly so, in such manner as to involve risk of collision; in other words, to cases in which, by day, each vessel can see the masts of the other in a line, or nearly so, with her own, and at night to cases in which each vessel can see the other's side lights, and each can see the range lights of the other in line, or nearly so. It does not apply to cases in which a vessel can see another ahead crossing her own course, or by night to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red

light without a green light or a green light without a red light is seen ahead, or where both green and red lights are seen anywhere but ahead.

88. Vessels approaching the sharper bends in the Canal, particularly when the next reach may be obscured, and all bends in Culebra Cut, shall, when at a distance of at least half a mile from such bend, slow down and blow one prolonged blast as a notification to other vessels which may be coming from the opposite direction; if there be no reply, the vessel may proceed, but vessels shall not pass each other in the bends of the Canal; if there be a reply to the blast first sounded, both vessels shall stop and proceed cautiously, following the rules of the road, but the vessel which has the turn of the bend on her port bow shall have the right to first proceed and make the turn.

89. When steam vessels are moved from their docks, or berths, and other vessels are liable to pass from any direction toward them, they shall sound a prolonged blast, but immediately after clearing their berths so as to be fully in sight, they shall be governed by the steering and sailing rules.

90. A prolonged blast shall also be sounded when approaching all signal stations or locks and when leaving the latter.

91. When steam vessels are running in the same direction, and the vessel astern desires to pass on the starboard hand of the vessel ahead, she shall give one short blast, and if the vessel ahead answers with one blast, they shall maneuver accordingly, but if the vessel ahead does not think it safe for the vessel astern to attempt to pass at that point, she shall immediately signify the same by giving several short and rapid blasts of the whistle, not less than four, and under no circumstances shall the vessel astern attempt to pass the vessel ahead until such time as they have reached a point where it can be safely done, when the vessel ahead shall signify her willingness by blowing the proper signals; the vessel ahead shall in no case attempt to cross the bow or crowd upon the course of the passing vessel.

92. Every vessel coming up with another vessel from any direction more than two points abaft her beam; that is, in such a position with reference to the vessel which she is overtaking that at night she would be unable to see either of that vessel's side lights, shall be deemed to be an overtaking vessel, and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally passed and clear. As by day the overtaking vessel can not always know with certainty whether she is forward of or abaft this direction from the other vessel, she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

93. After whistle signals have been made and answered, Canal craft must haul close out to the sides of the Canal and leave the center of the channels unrestricted for seagoing vessels; this applies particularly to the 500-foot channels and the Culebra Cut.

94. Unless specially authorized by the Governor, no owner, master, or operator of floating craft, except such as may belong to or be chartered by The Panama Canal, or such as may be engaged in passage of the Canal under charge of a Government pilot, shall cause or permit such craft to enter, navigate, or be present within that portion of the Panama Canal known as the Culebra Cut which lies between Gamboa and the Pedro Miguel lock.

95. For the better enforcement of this regulation, the officers and agents of the Canal, and the assistant engineers, superintendents, and supervisors employed under them by the authority of the Governor, shall have power and authority to arrest and take into custody, with or without process, any person or persons who may violate this rule.

96. Speed exceeding six knots per hour is prohibited in the Cut; large vessels, particularly when approaching a turn, shall go at the slowest speed that will enable them to keep their steerageway. This rule does not apply to vessels owned by the Canal.

97. The movement of vessels in the Culebra Cut will be regulated by orders to be issued by the Governor, which orders will be communicated to the masters of vessels by the pilots.

98. The Canal authorities may require any vessel to take a tug through the Cut, on approaching the locks, or in any other part of the Canal, when in their opinion it may be necessary to insure the safety of the vessel or to prevent accident or grounding.

99. Should a vessel be unwieldy, steer badly, or be hard to handle, the captain or master should so report and request the services of a tug to assist him through the Cut, should he deem it necessary.

100. On approaching another vessel under way in the narrow reaches, or before passing a vessel that has been tied up, or lighters, scows, dredgers, piledrivers, or anything that is afloat, whether moored, anchored, or under way, vessels shall blow a prolonged blast and slow down in plenty of time to pass at the slowest speed at which they can be steered.

101. The following speeds shall not be exceeded by vessels in transit through the Canal:

	Knots per hour.
Colon to Gatun locks	6
Gatun Lake, in the 1,000-foot channels	15
Gatun Lake, in the 800-foot channels	12
Gatun Lake, in the 500-foot channels	10
Culebra Cut	6
Miraflores Lake	6
Miraflores locks to Pacific entrance to Canal	6
Steamers entering or leaving a port	6

102. The Governor may change the rules in regard to speed and the use of tugs at any time that he may see fit, but will give due notice in case any changes be made.

103. Under no condition will steamers be allowed to run side by side in any part of the Canal proper, terminal port, or adjacent waters, both going in the same direction, except for the time necessary for one steamer to pass ahead of another, after the proper signals have been made and answered; nor shall such passing take place in any of the bends of the Canal; should an occasion arise, however, where steamers may find themselves running side by side, or nearly so, in the same direction, in the open waters or elsewhere, the steamer on the right or starboard side shall have the right of way, and the steamer on the left or port side shall check her way, drop astern, and keep at a safe distance until the bend shall have been passed or there is no further danger of collision.

104. When two steamers are approaching each other at right angles or obliquely so as to involve risk of collision, other than when one steamer is overtaking another, the steamer which has the other on her port side shall hold her course and speed; and the steamer which has the other on her starboard side shall keep out of the way of the other by directing her course to starboard so as to cross the stern of the other steamer, or, if necessary to do so, slacken her speed, or stop, or reverse. The steamer having the other on her own port bow shall blow one blast of her whistle as a signal of her intention to cross the bow of the other, holding her course and speed, which signal shall be promptly answered by the other steamer by one short blast of her whistle as a signal of her intention to direct her course to starboard so as to cross the stern of the other steamer or otherwise keep clear.

105. If, from any cause whatever, the conditions covered by this situation are such as to prevent immediate compliance with each others' signals, the misunderstanding or objection shall at once be made apparent by blowing the danger signal, and both steamers shall be stopped and backed, if necessary, until signals for passing with safety are made and understood.

106. Every vessel which is directed by these rules to keep out of the way of another vessel, shall, if the circumstances of the case permit, avoid crossing ahead of the other.

107. Every vessel which is directed by these rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed, or stop, or reverse.

108. When a steam vessel and a sailing vessel are proceeding in such directions that they may involve the risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

109. When two sailing vessels are approaching one another so as to involve risk of collision, one of them shall keep out of the way of the other, as follows:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

110. Where, by any of these rules, one of two vessels is to keep out of the way, the other shall keep her course and speed.

111. Notwithstanding anything contained in these rules, every vessel overtaking another shall keep out of the way of the overtaken vessel.

112. Sailing vessels underway shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels or boats.

113. Nothing in these rules shall exonerate any vessel, or the owner, or master, or crew thereof, from all the consequences of any neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

114. In obeying and construing these rules due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

115. In fog, mist, or heavy rainstorms, whether by day or night, signals shall be given as follows:

(*a*) A steam vessel underway, except when towing other vessels or being towed, shall sound, at intervals of not more than one minute, on the whistle or siren, a prolonged blast.

(*b*) A vessel when towing other vessels shall sound, at intervals of not more than one minute, on the whistle or siren, three blasts in succession, namely: One porlonged blast followed by two short blasts.

(*c*) Seagoing dredges, when dredging in a fog, shall give four blasts in succession: One prolonged blast followed by three short blasts.

(*d*) A vessel towed may give, at intervals of not more than one minute, on the fog horn, a signal of three blasts in succession, namely: One prolonged blast followed by two short blasts, and she shall not give any other.

(*e*) A sailing vessel underway shall sound, at intervals of not more than one minute, when on the starboard tack one blast, when on the port tack two blasts in succession, and when the wind is abaft the beam three blasts in succession.

(*f*) All rafts or other water craft, not herein provided for, navigated by hand power, horsepower, or by the current of the river, shall sound a blast on the fog horn, or equivalent signal, at intervals of not more than one minute.

(*g*) A vessel at anchor shall, at intervals of not more than one minute, ring the bell rapidly for about five seconds.

116. Every vessel shall, in fog, mist, or heavy rainstorm, go at a moderate speed slow down, or stop, having due regard to the existing circumstances and conditions.

117. A steam vessel hearing, apparently forward of her beam, the fog signal of a vessel the position of which is not ascertained, shall, as far as the circumstances of the case admit, stop her engines, and then navigate with caution until the danger is over.

118. In thick and foggy weather vessels will not be allowed to enter the Canal or leave the locks or mooring station, until the weather has cleared. Vessels in transit, when overtaken by thick or foggy weather, must immediately take every precaution and make preparation to anchor or moor at the first available place, and so remain until the weather clears. Vessels equipped with radio, when overtaken by thick or foggy weather, should immediately so report, in order that the proper fog signal may be made at the mooring stations on the approach of such vessels.

119. In order further to assure safe navigation in thick or foggy weather, masters of vessels shall have prepared accurate tables showing their compass error, before they will be allowed to enter the Canal. The general direction of the Canal and its reaches is southeasterly and northwesterly, and it would be well, if an opportunity offers, for vessels to obtain an accurate deviation table on these courses, while in the approximate latitude and vicinity of the Canal.

120. Upon the first approach of thick weather of any kind, the position of the ship must be accurately checked and the closest possible reckoning be kept until the weather clears, or she shall have been moored or anchored.

121. Unnecessary sounding of the steam whistle, except as a danger signal or in case of fire or emergency, is prohibited within the waters of the Canal Zone; and any licensed officer in charge of a steamer who authorizes or permits such unnecessary whistling shall, upon conviction thereof before the Board of Local Inspectors having jurisdiction, be suspended from acting under his license, if the inspectors trying the case so decide.

122. The word "visible" in these rules, when applied to lights, shall mean visible on a dark night with a clear atmosphere.

123. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

124. A steam vessel when under way shall carry:

(*a*) On or in front of the foremast, or, if a vessel without a foremast, then in the fore part of the vessel, a bright white light so constructed as to show an unbroken light over an arc of the horizon of 20 points of the compass, so fixed as to throw the light 10 points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible at a distance of at least five miles.

(*b*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least two miles.

(*c*) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of 10 points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

(*d*) The said green and red side lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

(*e*) A seagoing steam vessel shall carry an additional white light similar in construction to the light mentioned in subdivision "*a*." These two lights shall be so placed in line with the keel that one shall be at least 15 feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance of these lights shall be less than the horizontal distance.

125. A steam vessel when towing another vessel shall, in addition to her side lights, carry two white bright lights in a vertical line, one over the other, not less than three feet apart, and when towing more than one vessel, shall carry an additional bright white light three feet above or below such lights, if the length of the tow measuring from the stern of the towing vessel to the stern of the last vessel towed exceeds 600 feet. Each of the lights shall be of the same construction and character, and shall be carried in the same position as the white light "*a*," previously mentioned for steamers.

126. Such steam vessel may carry a small white light abaft the funnel, aftermast, or at the stern, for the vessel towed to steer by, but such light shall not be visible forward of the beam.

127. A sailing vessel under way or being towed shall carry the same lights "*b*" and "*c*" as are prescribed for a steam vessel under way, with the exception of the white lights mentioned, which they shall never carry.

128. Whenever, as in the case of vessels of less than 10 gross tons under way during bad weather, the green and red side lights can not be fixed, these lights shall be kept at hand lighted and ready for use, and shall, on the approach of or to other vessels be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides. To make the use of these portable lights more certain and easy, the lanterns containing them should each be painted outside with the color of the light which they respectively contain, and shall be provided with proper screens.

129. Pilot vessels when engaged on their station on pilotage duty shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed 15 minutes.

130. A steam pilot vessel when engaged on pilotage duty and not at anchor shall, in addition to the lights required for all pilot vessels, carry at a distance of eight feet below her white masthead light, a red light visible all around the horizon and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least two miles, and also the colored side lights required to be carried by vessels when under way.

131. When engaged on her station on pilotage duty and at anchor she shall carry, in addition to the lights required for all pilot boats, the red light above mentioned, but not the colored side lights.

132. Fishing vessels less than 10 gross tons, when under way, and not having their nets, dredges, or lines in the water, shall carry the usual white light eight feet above the deck and shall have ready at hand a lantern with a green glass on one side and a red glass on the other side, and on approaching or being approached by another vessel, such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

133. All fishing vessels and fishing boats of 10 gross tons or upward, when under way and not having their nets, trawls, dredges, or lines in the water, shall carry and show the same lights as other vessels under way.

134. All vessels, when trawling, dredging, or fishing with any kind of dragnets or lines, shall exhibit, from some part of the vessel where they can be best seen, two lights. One of these lights shall be red and the other shall be white. The red light shall be above the white light, and shall be at a vertical distance from it of not less

than 6 feet and not more than 12 feet; and the horizontal distance between them, if any, shall not be more than 10 feet. These two lights shall be of such a character and contained in lanterns of such construction as to be visible all around the horizon, the white light at a distance not less than three miles and the red light not less than two miles.

135. A vessel which is being overtaken by another shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

136. A vessel under 150 feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light, in a lantern constructed so as to show a clear, uniform and unbroken light visible all around the horizon at a distance of at least one mile.

137. A vessel of 150 feet or upward in length when at anchor shall carry in the forward part of the vessel, at a height of not less than 20 feet and not exceeding 40 feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall not be less than 15 feet lower than the forward light, another such light.

138. The length of the vessel shall be deemed to be the length appearing in her certificate of registry.

139. Every vessel may, if necessary in order to attract attention, in addition to the lights which she is by these rules required to carry, use a flare-up light or use any detonating signal that cannot be mistaken for a distress signal.

140. Every barge, lighter, canal boat, or scow that is moored alongside of any ship or another barge, or to the side of the Canal, or to any wharf, or lying at anchor on the navigable waters of the Canal Zone, shall show, between the hours of sunset and sunrise, a white light on the bow and stern, at least three feet above the deck of said vessel, and not less than eight feet from the bow and stern thereof.

141. Nothing in these rules shall interfere with the opration of any special rules made by the government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective governments, and duly registered and published, unless specific instructions are given by the Canal authorities to discontinue the use of such lights while in transit through the Canal.

142. A steam vessel proceeding under sail only, but having her funnel up, may carry in daytime, forward, where it can best be seen, one black ball or shape two feet in diameter.

143. Seagoing suction dredges, when under way and dredging, shall carry, beside the lights prescribed for steamers under way, between the two masts where they can best be seen, two red lights approximately the same height as the masthead light of a steamer, in a vertical line one over the other, not less than six feet apart, and of such a character as to be visible all around the horizon at a distance of at least two miles; and they shall, by day, carry between the two masts where they can best be seen, in a vertical line one over the other not less than six feet apart, two black balls or shapes, each two feet in diameter.

144. Seagoing suction dredges, when dredging is stopped and the dredge is proceeding either to or from her dumping ground, either loaded or light, shall, at night, extinguish the two red lights and, by day, lower the black balls.

145. Seagoing suction dredges, while actually engaged in dredging, as shown by the black balls or red lights, above, shall have the right of way over all other vessels, but in the narrower reaches and the Culebra Cut shall give way to seagoing ships; but when not dredging, as shown by the absence of the black balls or red lights, shall observe all the rules, and have no special privilege.

146. Ferryboats, propelled by machinery and navigating the waters of the Canal Zone, shall carry the range lights and the side lights required by law to be carried on steam vessels.

147. Barges, canal boats, scows, and lighters being towed astern of steam vessels, when towing singly or what is known as tandem towing, shall each carry a white light on the bow and a white light on the stern.

148. When towed with a hawser two or more abreast, when in one tier, they shall carry a white light on the bow and a white light on the stern of each of the outside boats; when in more than one tier, each of the outside boats shall carry a white light on its bow; and the outside boats in the last tier shall each carry, in addition, a white light on the outer after part of the stern.

149. Barges, etc., towed alongside a steam vessel, if on the starboard side of said steam vessel, shall display a white light on her own starboard bow, and if on the port side of said steam vessel, shall display a white light on her own port bow; and if there be more than one barge or canal boat alongside, the white light shall be displayed from the outboard side of the outside barge or canal boat.

150. When barges, etc., are in tiers and towed at a hawser, there shall be carried on the forward port side of each tier a white light, and on the forward starboard side of the starboard boat in each tier a white light, and on the after port side of the port boat in the stern tier a white light, and on the after starboard side of the starboard tier a white light.

151. Rafts propelled by hand power, or by the current of the river or tide, or which shall be anchored in or near the channel or fairway, or proceeding in tow of a steam vessel, shall carry one white light on each outside corner of the raft, making four lights in all.

152. Row boats and cayucos, whether under oars or sail, shall carry a white light, visible all around the horizon, at an elevation above the surface of the water of at least three feet.

153. The white light required by these rules for rafts and other water craft shall be carried from sunset to sunrise, in a lantern so constructed as to show a clear, uniform, and unbroken light, visible all around the horizon, and of such intensity as to be visible on a dark night with a clear atmosphere at a distance of at least one mile. The lights for rafts shall be suspended so that the lights shall not be less than eight feet above the surface of the water.

154. Any piece of plant, whether dredge, rock-breaker, or drill barge, that is operated by means of fore, aft, and side chains, shall carry, when said fore, aft, and side chains are taut, a black ball on each side of the dredge, in some conspicuous place at least eight feet above the deck, and near the position of the side chains; at night these balls shall be replaced by a red light and which shall show all around the horizon and be plainly visible at a distance of one mile.

155. When a steamer wishes to pass the dredge, drill boat, or rock-breaker, at a point where it might foul its side chains, it should ask permission to pass, by using the signal for port or starboard, as provided in the foregoing rules, and the dredge, drill boat, or rock-breaker shall immediately lower its chain on the side asked for by the steamer, indicating its fulfillment of this by, in the daytime, lowering the ball; in the night, putting out the red light.

156. If the dredge, drill boat, or rock-breaker is unable to lower its side chain, or should consider it dangerous for the steamer to pass on the side asked for, the dredge, drill boat, or rock-breaker will blow the danger signal, when the steamer will stop until the ball or light signal given above shall be shown.

157. Any master or pilot of any steam vessel who shall flash or cause to be flashed the rays of the searchlight into the pilot house of a passing vessel shall be deemed guilty of misconduct and shall be liable to have his license suspended or revoked; in general, searchlights shall not be used for navigation purposes in transit through the Canal, since the aids to navigation are sufficiently abundant to obviate any danger or necessity for using them.

158. When a vessel is in distress and requires assistance from other vessels, or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, namely:

First: Flames on a vessel, as from a burning tar barrel, oil-barrel, etc.

Second: A continuous sounding with any fog-signal apparatus, or firing a gun.

Third: Rockets or shells showing stars, fired one at a time, at short intervals.

159. In connection with these, vessels may use the international code and special signals with shapes, hereafter described.

160. When lighters, barges, scows, or canal boats are tied or moored along any wharf, or along the shore in the channel in the navigable waters of the Canal Zone, including the Canal and approaches thereto, it shall be unlawful to moor them more than two deep, thereby obstructing the channel.

161. Except in the terminal harbors or the authorized anchorages, vessels shall not moor alongside one another in any part of the Panama Canal. In the terminal harbors and authorized anchorages more than two vessels shall not be moored alongside each other, except that additional power hoists may be moored alongside two vessels so connected, while actually engaged in transshipping cargo.

162. Nothing in this rule shall be construed as affecting the right of The Panama Canal to moor barges used by Canal construction and maintenance in any manner that may be deemed proper.

163. Every piece of plant, except seagoing suction dredges, whether dredge, rock breaker, or drill barge, that is engaged in excavating or preparing to excavate the Canal, whose position is stationary, or moving from time to time over the face of the shoal that it is working on or removing, shall have the prior right to such position, and it shall be unlawful for any person or persons, navigating a ship or otherwise, to foul above-named plant or its moorings in any way whatever.

164. All barges moved from berth to berth along wharves or banks of the Canal shall be moved by being handled by proper towboat for same, and it shall be unlawful to move barges by hand power in the navigable fairways of the Canal, unless to preserve life or property in peril.

GENERAL REGULATIONS.

165. While in a terminal port or in transit through the Canal no vessel will be allowed to throw overboard any ashes, cinders, ballast, solid matter of any kind, boxes, paper, or anything that will float, heavy slops, or anything that will tend to deface or make the waters of the Canal unsanitary. This does not apply to water-closet chutes, nor to the water used in cooking or in cleaning tableware, but does prohibit the throwing overboard of bones, pieces of meat, vegetable and fruit parings, or any heavy slops that can be carried until the open water of the sea can be reached.

166. No vessel shall make fast or run any lines to any marking buoy, beacon, or aid to navigation; this does not prohibit the use of mooring buoys for the purpose for which they were intended; vessels must use every precaution to guard against injury to any of the aids to navigation in Canal waters; should any damage or injury be inflicted, it shall be immediately reported to the Captain of the Port.

167. Any vessel arriving at the ports with gunpowder or other explosives on board will not be admitted to the wharves or allowed to land the same until a report is made to the proper authority and an arrangement entered into for the immediate disposal of the explosives.

168. Vessels are not allowed to anchor in the channel of the Canal or its approaches, unless in case of distress, when assistance should at once be requested.

169. If for any reason not an emergency, a vessel must anchor, she must do so in such a location that it will not interfere with the navigation of the channels.

170. All vessels upon entering port will be assigned to anchorage or wharves by the Captain of the Port.

171. Vessels must not anchor on the range line of any range lights.

172. Vessels will be held liable for all damage done to the Canal or any part of its plant or equipment, of any character or description whatsoever, whether the damage be done to the floating equipment, wharves, locks, or banks of the Canal; and in the case of the sinking of any floating or other equipment belonging to private persons or corporations in the channel of the Canal, or its approaches, side channels, or along its wharves, that create or tend to create an obstruction in the Canal or its approaches, side channels, or along its wharves, the person or company owning the sunken equipment may be given thirty days to remove the same. Should he or they fail to do so, the Canal authorities may remove the obstruction and the person or corporation owning the same shall pay all the expense of the removal of the obstruction, to be collected by a civil suit in the Zone courts and a levy and sale of any property of the persons or corporations found in the Canal Zone or its harbors.

173. The Canal authorities may order the removal of the obstruction at once, or remove it without waiting for action by the owners, and the cost of such removal shall be taxed and collected as mentioned above.

174. Should a vessel go aground, collide, be in imminent danger, or meet with any serious accident while in Canal waters, the Canal authorities shall have the right to supervise and direct all operations in relation thereto that may be necessary to float her or clear the wreckage; but the master and all others under him, as well as every appliance on board the ship which may be of use, shall be placed at the disposal of the Canal authorities without additional charge or claim against the Canal.

175. Vessels wishing to unload or load ballast will be assigned anchorage by the Captain of the Port, and must have a proper chute, so arranged as to prevent ballast from falling overboard.

176. No warp or line shall be passed across any channel or dock so as to obstruct the passage of vessels or cause any interference with the discharging of cargoes.

177. If any damages shall be caused by vessels or their mooring cables to the works of any harbor, the parties responsible for same shall pay the costs for necessary repairs, and the same may be recovered in the courts of the Canal Zone.

178. If a vessel occupying a berth at a wharf or pier, with or without the consent of the Captain of the Port, fails to vacate such berth when ordered by him, or when not loading or unloading fails to make way for another vessel that wishes to load or unload, the Captain of the Port shall then cause such vessel to be moved to some other berth, or be anchored in the stream, and the expense of such removal shall be paid by the master, agents, or owners of such vessel, and in case of their neglect or refusal to pay such expense upon demand, it may be recovered in an action before any court having jurisdiction.

179. No vessel shall be entitled to a berth until application has been made by the master, owner, or consignee of the vessel, to the Captain of the Port, and such application must state the length, draft, and kind of cargo. No one but the Captain of the Port has authority to assign berths to vessels. No vessel, whether at anchor or lying at a wharf, shall shift its berth, without permission from the Captain of the Port.

180. All goods, merchandise, and material of every kind, landed or placed on any pier, bulkhead, or other wharf property, or upon reclaimed land, must be removed therefrom within 36 hours, provided, that the Captain of the Port for good cause may extend the time. All goods, merchandise and materials of every kind encumbering any pier, bulkhead, or other wharf structure or reclaimed land, after the time designated for the removal thereof shall have expired, will be liable to be removed by the Captain of the Port to any warehouse or yard, at the sole risk and expense of the owner of such goods, merchandise, or materials, and all expense incurred for such removal and storage, or otherwise, shall be and become a lien thereon, and such goods, merchandise, and materials will not be delivered to the owner until the expense of such removal and storage has been paid.

181. It shall not be lawful for the owners, lessees, or occupants of any pier, wharf, or bulkhead, which has been covered with a shed, to use such shedded pier, wharf, or bulkhead for the permanent storage of goods, merchandise, cargo, or material of any kind which may be discharged or placed thereon.

182. Piers, wharves, and bulkheads thus shedded are designated for the protection of merchandise and cargo in transit, and such merchandise and cargo must be removed therefrom within 36 hours; provided, that the Captain of the Port may for good cause extend the time.

183. No accumulation of material upon the piers, wharves, bulkheads and reclaimed land will be allowed, and whenever any pier, wharf, bulkhead or reclaimed land shall be encumbered or obstructed in its free use by any vessel, merchandise or material, or by any structure, encumbrance, or obstruction not authorized or permitted, the Captain of the Port may require the owner, agent, consignee, or person occupying or in charge of such merchandise or obstruction, to remove the same without delay. Upon receiving said order the owner, agent, consignee, or person in charge of the vessel, merchandise, material, structure, encumbrance, or obstruction, in reference to which said order or direction was given shall comply with the same without delay and upon his refusal or failure to do so, shall be punished by a fine or imprisonment as hereinbefore provided.

184. No fishing nets will be allowed in any place in the Canal, along its wharves, or in its channels, whenever in the opinion of the Superintendent of Transportation such nets interfere or might interfere with navigation, and it shall be the duty of the owner thereof, upon notification, to remove them immediately.

185. Anyone finding any buoy out of position, or lights not working properly, should immediately report the same to the Captain of the Port.

186. Steamers while within a harbor must take all precautions to avoid the issue of sparks, and vessels will be held liable for all damage resulting from neglect of this rule.

187. No pitch, tar, turpentine, or other combustible, shall be boiled on any wharf, or on board any vessel without permission from the Captain of the Port.

188. In case of fire on board a vessel, all masters of other vessels shall render such assistance as may be in their power.

189. A vessel anchored or moored in the harbor or lying at a dock must at all times, night or day, have on board a sufficient number of men to take care of the vessel.

190. No vessel shall unload lumber, timber, or piles in the waters of a harbor without permission of the Captain of the Port, who shall designate where such lumber shall be rafted, so as to avoid obstructing or hindering the movements of vessels.

191. Lighters, barges, scows, and other vessels belonging to persons or corporations of any and all descriptions shall be anchored in such places as the Captain of the Port may direct, and shall be at all times under his supervision and direction.

192. The Captain of the Port shall keep in his office records of all his proceedings with statements of the result of all examinations and inquiries made by him, which records may be inspected by interested parties.

193. All notifications and requests to the Captain of the Port shall be made at his office, in writing, and shall be duly entered and filed by him.

194. It shall be unlawful for any person, without first having secured a pilot's license from the Government of the Canal Zone, to navigate any steam vessel with a net tonnage of more than 15 tons burden in Canal Zone waters.

195. All privately owned boats of every description must be registered and numbered, and the number must be obtained before they will be allowed to operate in any part of the Canal waters.

196. When numbers have been assigned, they shall be displayed in a conspicuous place, in the prescribed form.

197. All vessels moored to wharves, whether loading or unloading cargo or in the ordinary way of business, shall be moored to the wharves with rope hawsers only, and it shall be unlawful for any chain or wire hawsers to be used on any public wharf in the Canal Zone without the specific permission of the Captain of the Port.

198. All vessels, whether commercial or otherwise, moored to wharves in the Canal Zone, shall be compelled to keep watch at night and to have suitable fire-fighting apparatus on hand.

199. Whenever it shall become necessary to remove any especially inflammable cargo from commercial ships, or ships at public wharves of the Canal Zone, such as oils, gasoline, naphtha, petroleum, etc., it shall be necessary for notice to be given to the Captain of the Port at least two hours before such cargo shall be discharged upon the wharf, so that proper means can be provided to dispose of this class of material at the earliest possible moment.

200. It shall be unlawful for any person or persons, whether navigating a vessel or otherwise, to take possession of or use for any purpose, to make fast to or build upon, to alter, deface, destroy, move or injure any part of the plant or equipment, whether floating or otherwise, belonging to the Canal.

201. These rules shall apply to and govern the navigation and use of the waters of the Panama Canal, as the Canal is now or may hereafter be constituted, as well as all Canal channels, lakes, harbors, and other auxiliary waters as may now or hereafter be deemed necessary for Canal purposes, or which may now or hereafter be under the jurisdiction of the Canal Zone Government.

WOODROW WILSON.

THE WHITE HOUSE, *9 July, 1914.*

[No. 1990.]

EXECUTIVE ORDER.

The area of land hereinafter described, situated in the Canal Zone, is hereby set apart and assigned to the uses and purposes of a radio station and other naval purposes under the control of the Secretary of the Navy; but said area shall be subject to the civil jurisdiction of the Canal Zone authorities in conformity with the Panama Canal Act.

The said area is described as follows:

DARIEN NAVAL RADIO STATION.

Beginning at a point "A" on the map, which is the point at which the water level of Gatun Lake meets a line parallel to the center line of the Panama Railroad and 100 feet distant therefrom on the side toward the Canal, this meeting point being the first such point south of Station 1051 plus 70.3 of the Panama Railroad, which latter point is marked by an iron rail monument noted "P" on the map; continuing thence on the line "A"-"B"-"C"-"D"-"E"-"F"-"G"-"H"-"I"-, which line is at the water level of Gatun Lake, and is a meandered line extending southwesterly, south, and easterly, to point "I," where the said water level intersects a traverse line shown on the map as of azimuth 250° 02′; thence for a distance of about 130 feet to point "J," which is the intersection of two traverse lines indicated on the map as of azimuth 250° 02′ and 1° 54′, respectively; thence for a distance of 433.8 feet on an azimuth of 1° 54′ to point "K" on the map, this point being the intersection of the 1° 54′ azimuth line with the aforesaid line parallel to and 100 feet distant from the center line of the Panama Railroad, immediately south of station 1074 plus 52 on the Panama Railroad which latter point is marked with an iron rail monument and is noted "Q" on the map; thence along the aforesaid line parallel to the Panama Railroad to the point of beginning; in all 87.5 acres, more or less.

The areas below lake level forming indentations into the general area of the site beyond lines "B"-"C", "C"-"D", "E"-"F", "G"-"H", and "J"-"K", are included in the area hereby set aside;

all as shown by the blue print No. 3846, dated March 30, 1914, issued by the Department of Construction and Engineering, Isthmian Canal Commission, office of the Assistant to the Chief Engineer.

WOODROW WILSON.

THE WHITE HOUSE, *30 July, 1914.*

[No. 2006.]

EXECUTIVE ORDER.

Prescribing the Duties of Constables.

By virtue of the authority vested in me, I hereby establish the following Order for the Canal Zone:

The constables of the magistrates' courts of the Canal Zone are hereby declared to be peace officers with the powers and duties imposed by law upon such officers. They shall attend all sessions of the magistrate's court for the town and subdivision to which they may be assigned by the Governor of the Panama Canal; shall preserve order therein; shall receive and receipt for all moneys collected by them upon any process or paid into or deposited with said magistrate's court as fees, fines, costs, forfeitures, or bail; and shall duly account therefor in accordance with rules and regulations to be prescribed by the Governor of The Panama Canal.

All laws or orders, or parts thereof, in conflict with this order are hereby repealed.

WOODROW WILSON.

THE WHITE HOUSE, *August 3, 1914.*

[No. 2007.]

EXECUTIVE ORDER.

To Reorganize the Board of Health of The Canal Zone.

By virtue of the authority vested in me, I hereby establish the following Executive Order for the Canal Zone:

1. There is hereby established a Board of Health, under the jurisdiction of the Health Department, consisting of the following officials heretofore appointed by the Governor:

The Chief Health Officer, who shall be the Chairman of the Board, the General Inspector, the Chief Quarantine Officer, the Chief of Laboratories, and the Chief of the Division of Municipal Engineering.

Three members of the Board shall constitute a quorum for the transaction of business and each member of the Board shall be entitled to a vote and, in the event of a tie, the presiding officer shall cast the deciding vote.

The Governor shall fix the time for the regular meetings of the Board, and the Chief Health Officer may call special meetings of the Board when he deems it necessary.

2. The Board of Health shall have power to make sanitary rules and regulations for the Canal Zone, not inconsistent with existing laws or orders, which rules must be approved by the Governor before they become effective, and the Board shall perform such other duties as may be assigned to it by the Chief Health Officer from time to time.

3. Sections 13, 14, 15 and 16 of Act 8 of the Isthmian Canal Commission, of September 2, 1904, are hereby repealed.

4. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *6 August, 1914.*

[No. 2014.]

EXECUTIVE ORDER.

Relating to the Customs Service.

By virtue of the authority vested in me I hereby establish the following Order for the Canal Zone:

1. If the master of a vessel, arriving at any port in the Canal Zone from a foreign port, shall fail or refuse to produce to the proper officer of the customs, upon demand by him, the ship's manifest and copies thereof, or shall fail or refuse to give a true account of the destination of such vessel, he shall be subject to a fine of not exceeding five hundred dollars.

2. If any merchandise be found on board any vessel arriving in the Canal Zone from a foreign port which is not included in her manifest, the master of such vessel

shall be liable to a penalty equal in amount to the value of the merchandise not manifested, and all such merchandise, belonging to or consigned to the officers or crew of the vessel, shall be forfeited, provided, however, that the penalty authorized by this section shall not be imposed if it should be made to appear to the chief customs officer at the port of entry, or to the court in which the trial shall be held, that no part of the cargo has been unladened, except as accounted for in the master's report, and that the errors and omissions in the manifest were made without fraud or collusion; in such case the master may be allowed to correct his manifest by means of a post-entry. It shall not be lawful to grant a permit to unload any such merchandise, so omitted from the manifest, before such post-entry or addition to report or manifest has been made.

3. If sea stores are found on board of a vessel arriving at the Canal Zone from a foreign port which are not specified in the list furnished the boarding officer, or if a greater quantity of such articles is found than that specified in such list, or if any of the articles are landed without a permit being first obtained from the customs officer for that purpose, all of such articles omitted from the list or manifest, or so landed, shall be seized and forfeited, and the master of the vessel shall be liable to a penalty of treble the value of the articles so omitted or landed.

4. The officers of the Bureau of Customs are authorized to administer oaths and to certify invoices covering shipments of merchandise from the Canal Zone to the United States. In the performance of this duty they shall be governed by the United States Consular regulations, and by the circular instructions concerning the certification of invoices issued to consuls of the United States, in so far as they are applicable, provided, however, that any special instructions heretofore issued, or which may be issued by the Treasury Department, concerning the certification of invoices in the Canal Zone, shall be complied with.

5. Any person violating any of the customs laws, or the customs rules and regulations established, or to be established, by the Governor of The Panama Canal in conformity with existing laws and orders, shall be subject to a fine not exceeding five hundred dollars for each violation of such regulations.

6. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *8 August, 1914.*

[No. 2016.]

EXECUTIVE ORDER.

Relating to Postal Crimes in the Canal Zone.

By virtue of the authority vested in me I hereby establish the following Order for the Canal Zone:

SECTION 1. The Postal Laws and Regulations of the United States, not locally inapplicable, which define crimes against the Postal Service, and prescribe punishments therefor, are hereby extended to the Canal Zone, and shall be enforceable in the courts of the Canal Zone in the manner and form prescribed for other criminal cases by the Canal Zone laws.

SECTION 2. This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *14 August, 1914.*

[No. 2018.]

EXECUTIVE ORDER.

To Require Security for Costs in Civil Cases.

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone:

SECTION 1. The plaintiff in any civil suit, or special proceeding, may be ruled to give security for the costs upon motion of the defendant, or of any officer of the court interested in the costs accruing in such suit; and if such rule be entered against the plaintiff, and he fail to comply therewith, within the time prescribed by the court or judge thereof, the suit shall be dismissed.

A new or additional undertaking may be ordered within such time as the court or judge may prescribe, upon proof that the original undertaking is insufficient security, and failure on the part of the plaintiff to comply with the order of the court, or judge, within the time prescribed, shall cause the dismissal of the suit.

This section shall apply to suits in the magistrates' courts, as well as in the district court.

The security for costs required by this section may consist of a money deposit, bond of a surety company, or cost bond with two or more good and sufficient sureties; the form of such security to be determined by the judge or magistrate of the court before whom the proceedings are pending.

Section 2. All bonds given as security for costs shall authorize judgment against all of the obligors of said bonds for such costs, to be entered in the final judgment of the case or special proceedings.

Section 3. Any party to a suit, who is required to give security for costs, may file with the secretary, or his assistant, or with the magistrate, as the case may be, an affidavit to the effect that he is too poor to pay the costs of the court, and is unable to give security therefor. The secretary of the district court, or his assistant, or the magistrate, as the case may be, may contest the inability of the party to pay the costs, or his inability to give security for the same, the contest to be tried before the judge of the district court in cases pending in that court, and before the magistrate in cases pending in one of the magistrates' courts; and the contest shall be heard at such time as the court or magistrate may determine.

If no contest is made upon the affidavit, or if the same is admitted by the court or magistrate after the contest, it shall be the duty of the officers of the court thereafter to issue and serve all processes and perform all duties on behalf of such party as in other cases.

Section 4. The public administrator, and executors, administrators and guardians appointed by the courts of the Canal Zone shall not be required to give security for costs in any suit brought by them in their fiduciary character.

Section 5. No security for costs shall be required of The United States, The Panama Canal, The Canal Zone Government, or any of its dependencies.

Section 6. The provisions of this order, relating to security for costs, shall apply to an intervenor; and shall also apply to a defendant who seeks a judgment against the plaintiff on a counterclaim, after the defendant shall have discontinued his suit.

Section 7. When the costs are secured by the provisions of an attachment or other bond, filed by the party required to give security for costs, no further security shall be required.

Section 8. All laws, orders and decrees, or parts thereof, in conflict with this order, are hereby repealed, provided, that this order shall not be construed to impair the power conferred upon the courts in respect to costs by Article III of the Executive Order of September 29, 1911, "To Amend Sections 51, 62, and 526, And To Repeal Sections 63 and 529 of The Code of Civil Procedure Of The Canal Zone."

Section 9. This order shall take effect sixty days from this date.

Woodrow Wilson.

The White House, *14 August, 1914.*

[No. 2019.]

Executive Order.

To Amend the Executive Order of April 15, 1913, entitled: "Executive Order to Provide Maritime Quarantine Regulations for the Canal Zone and the Harbors of the Cities of Panama and Colon, Republic of Panama."

By virtue of the authority vested in me I hereby establish the following order for the Canal Zone:

I. The certificate to the form of original bill of health prescribed by section 1 of the Executive Order of April 15, 1913, entitled: "Executive Order to Provide Maritime Quarantine Regulations for the Canal Zone and the Harbors of the Cities of Panama and Colon, Republic of Panama," is hereby amended to read as follows:

I hereby certify that the vessel has complied with the quarantine rules and regulations of the Panama Canal, and that the vessel leaves this port bound for ——— ———, Canal Zone, or ——— ———, Republic of Panama, via ——— ———.

Given under my hand and seal this ——— ——— day of ——— 191—.

[SEAL.] ————————————————

(Signature of Consular Officer.)

II. The certificate to the form of supplemental bills of health prescribed by section 1 of the above mentioned Executive Order is hereby amended to read as follows:

I certify also that with reference to the passengers, effects, and cargo taken on at this port the vessel has complied with the quarantine rules and regulations of the Panama Canal.

Given under my hand and seal this ——— ——— day of ———, 191—.

[SEAL.] ————————————————

(Signature of Consular Officer.)

III. Section 1 of the above-mentioned Executive Order is hereby amended by adding the following paragraph to said section:

Vessels clearing from a foreign port to a port in the United States, or one of their dependencies, and touching at any port of the Canal Zone, or Panama or of Colon, Republic of Panama, shall not be required to obtain an additional bill of health under the quarantine rules and regulations of the Panama Canal, but it shall be sufficient that such vessel obtain extra copies of the bill of health and of the supplemental bill of health, if any, issued in the foreign port by the officer authorized by the quarantine laws of the United States. Such extra copies of the bill of health, or of the supplemental bill of health, as the case may be, shall be delivered by the Captain of the vessel to the quarantine officer of the Panama Canal upon arrival of the vessel in ports of the Canal Zone, or the ports of Panama or Colon, Republic of Panama.

IV. Section 16 of the said Executive Order is hereby amended by adding thereto the following paragraph:

The baggage of cabin passengers embarking at infected ports shall be treated as provided in this section for baggage of steerage passengers.

V. The second paragraph of section 19 of the above-mentioned Executive Order is hereby amended to read as follows:

(*a*) Vessels from the United States or their dependencies; (*b*) Vessels from foreign ports; (*c*) Vessels with sickness aboard; (*d*) Vessels from Panamanian ports where any quarantinable disease prevails; (*e*) Vessels from Panamanian ports carrying passengers or articles suspected by the quarantine officer as being capable of conveying the infection of a transmissible disease.

VI. Section 26 of the above-mentioned Executive Order is hereby amended to read as follows:

Section 26. The quarantine officer, after his inspection of the vessel and its documents, shall decide whether said vessel, or its personnel or passengers, or any article aboard said vessel is liable to convey any of the following diseases: plague, yellow fever, cholera, smallpox, typhus fever or leprosy; and, if so, such vessel shall be placed in quarantine and forbidden entry until free from such liability of conveying any such diseases, and he shall take such measures in respect to the vessel, its passengers or personnel or of cargo as in his judgment may be required to prevent the entry of such diseases into the Canal Zone, or the cities of Panama or Colon, Republic of Panama.

VII. Section 34 of said Executive Order is hereby amended to read as follows:

Any person violating any of the provisions of these regulations shall be punished by a fine not exceeding Five Hundred Dollars ($500.00), or by imprisonment in jail not exceeding ninety (90) days, or both such fine and imprisonment at the discretion of the court. The punishment herein prescribed shall be imposed by the district court of the Canal Zone.

VIII. This order shall take effect from and after the date upon which the Panama Canal is officially and formally opened for use and operation by the proclamation of the President of the United States.

WOODROW WILSON.

THE WHITE HOUSE, *August 14, 1914.*

[No. 2020.]

Executive Order.

Regulating Operation of Street Railway Cars at Crossings.

By virtue of authority vested in me, I hereby establish the following Executive Order for the Canal Zone:

Section 1. It shall be unlawful for a motorman or any person in control of a street railway car to run same over or upon any street crossing, road crossing, or street railway crossing, at a speed of more than five miles per hour, and without commencing to sound gong, horn, or whistle when at least one hundred feet from said crossing, and continuing to sound same until the crossing has been passed.

Section 2. It shall be unlawful for a motorman or any person in control of a street railway car to run same over or upon any railroad crossing, without bringing the car to a full stop at least ten feet from the nearest rail, and without ascertaining from a view of the railroad track made either by himself or by the conductor that the crossing may be safely passed.

Section 3. A violation of any of the provisions of this order shall be punished by a fine of not more than one hundred dollars, or imprisonment for not more than thirty days, or by both fine and imprisonment in the discretion of the Court.

Section 4. This order shall take effect thirty days from and after this date.

Woodrow Wilson.

The White House, *22 August, 1914.*

[No. 2026.]

Executive Order.

To Amend the "Rules and Regulations for the Operation and Navigation of the Panama Canal, etc."

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone:

I. Rule No. 2 of the "rules and regulations for the operation and navigation of The Panama Canal, and approaches thereto, including all waters under its jurisdiction," dated July 9, 1914, is hereby amended so as to read as follows:

2. Any person violating any of the provisions of the rules and regulations, established hereunder, shall be deemed guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine not to exceed five hundred dollars ($500.00), or by imprisonment not to exceed six months, or by both such fine and imprisonment, at the discretion of the court.

II. This order shall take effect from and after this date.

Woodrow Wilson.

The White House, *3 September, 1914.*

[No. 2037.]

Executive Order.

To Repeal the Executive Order of September 8, 1911, Establishing the Postal Savings System in the Canal Zone.

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone:

Section 1. The Executive Order of September 8, 1911, establishing the Postal Savings System in the Canal Zone, is hereby repealed: *Provided,* That accounts opened in accordance with that order, and the regulations established thereunder, shall continue as prescribed in said order and regulations until they are finally closed by the withdrawal of the deposits.

Section 2. For the accommodation of persons desiring to deposit their savings in the post offices of the Canal Zone, money orders may be issued in the Canal Zone payable to the purchaser at the office of issue, for which no fee shall be charged.

Section 3. This order shall take effect from and after October 1, 1914.

Woodrow Wilson.

The White House, *5 September, 1914.*

[No. 2040.]

EXECUTIVE ORDER.

By direction of the President, it is ordered:

That Nicholas Cornet, who has been appointed a member of the Joint Commission for the appraisement and settlement of damages to property in the Canal Zone, in accordance with the provisions of Articles Six and Fifteen of the Convention between the United States and Panama, concluded November 18, 1903, be allowed Twenty-five ($25) dollars per day for his services, including all expenses, from the time of his sailing from New York until his return thither; provided that he shall be granted free transportation on the Panama Railroad Steamship Line from New York to the Isthmus and return, free transportation over the Panama Railroad, and such other transportation as may be necessary when traveling on official business on the Isthmus; he shall also be allowed the ordinary privileges of Government employees on the Isthmus, including employees' rates at the hotels of the Panama Canal or the Panama Railroad Company on the Isthmus.

LINDLEY M. GARRISON,
Secretary of War.

WAR DEPARTMENT,
Washington, D. C., September 8, 1914.

EXECUTIVE ORDER.

To Amend the Canal Zone Law against Gambling.

By virtue of the authority vested in me I hereby establish the following order for the Canal Zone:

I. Section 1 of Act No. 4, entitled "An Act to Prohibit Gambling in the Canal Zone, Isthmus of Panama, and to Provide for the Punishment of Violations thereof, and for other purposes," enacted by the Isthmian Canal Commission on August 22, 1904, is hereby amended to read as follows:

SECTION 1. Every person, within the limits of the Canal Zone, who shall play at any game whatever for any sum of money or other property of value, or shall bet any money or property upon any gaming table, bank, or device, or at or upon any other gambling device, or who shall bet upon any game played at or by means of any such gaming table or gambling device, shall, upon conviction, be fined in any sum not exceeding One Hundred Dollars ($100.00), or by imprisonment in jail not exceeding thirty (30) days, or shall suffer both such fine and imprisonment in the court's discretion.

II. This order shall take effect thirty days from and after its publication in the Canal Record.

WOODROW WILSON.

THE WHITE HOUSE, *19 September, 1914.*

[No. 2051.]

EXECUTIVE ORDER.

To Amend the Executive Order of March 20, 1914, Relating to Compensation to be Paid to Injured Employees of the Panama Canal and Panama Railroad Company.

By virtue of the authority vested in me, I hereby establish the following order for the Canal Zone:

SECTION 1. Paragraph E of Section 12, of the Executive Order of March 20, 1914, relating to injury compensation to be paid to employees of The Panama Canal, and the Panama Railroad Company, is hereby amended to read as follows:

(E) If the deceased employee leaves a parent, either partially or wholly dependent on him for support; or a brother, sister, grand-parent or grand-child, wholly dependent on him for support, there may be paid to such relation monthly such portion or portions of the monthly pay of the employee as may be determined by the Governor of The Panama Canal, provided that the total compensation to all beneficiaries under this and paragraphs A, B, C, and D of this section shall not exceed fifty per cent of the monthly pay of the deceased employee, and provided, that in order to make payment to the relatives under this paragraph, the Governor of The Panama Canal may, if necessary, reduce the proportion payable to widow or children under paragraphs A, B, C, and D of this section, and provided further, that payment for the benefit of a relative under this paragraph shall cease if he dies, marries, or, in the opinion of the Governor, becomes capable of self-support, but in no case shall payment continue more than eight years.

This amendment shall be effective from the date the order of March 20, 1914, became effective, viz: April 1, 1914.

WOODROW WILSON.

THE WHITE HOUSE, *19 September, 1914.*

[No. 2052.]

EXECUTIVE ORDER.

By direction of the President, and by virtue of the authority vested in him under the Panama Canal Act, the following regulations relative to payment of tolls and of bills for materials, supplies, repairs, harbor pilotage, towage, and other services furnished by The Panama Canal to vessels operated by the Government of the United States are hereby prescribed:

1. Any former Executive Order requiring the payment of tolls by vessels operated by the Government of the United States before such vessels are permitted to pass through The Panama Canal, or requiring the payment of bills for material, supplies, repairs, harbor pilotage, towage, and other services furnished such vessels by The Panama Canal before clearance papers may be given, is hereby amended to permit the passage of such vessels through the Canal and the issuance of clearance papers on transfer, between the proper officials of the vessel and the proper officials of The Panama Canal, of the necessary papers indicating the service rendered or the work performed. Bills for tolls and other services or work herein indicated shall be prepared by The Panama Canal against the department of the United States Government concerned and shall be submitted by the Governor of The Panama Canal to such department through the Secretary of War.

LINDLEY M. GARRISON,
Secretary of War.

WAR DEPARTMENT, *September 29, 1914.*

EXECUTIVE ORDER.

Providing for License Taxes and Fees.

By virtue of the authority vested in me I hereby establish the following order for the Canal Zone:

SECTION I. There shall be collected the following taxes for operating, in the streets and roads of the Canal Zone, public vehicles not drawn or propelled by steam, gasoline, electricity, or other motive power:

(*a*) For each coach, carriage, or other conveyance employed in the transportation of passengers for hire, $12.00 per annum.

(*b*) For each cart, dray, wagon, or other conveyance employed in the transportation of freight, merchandise, or other property, or employed by any merchant in the transportation of merchandise; $20.00 per annum for each two-wheel vehicle; and $30.00 per annum for each four-wheel vehicle.

The foregoing licenses shall be paid for the fiscal year: *Provided*, That the licensee may obtain a license for any period of the fiscal year not less than three months, upon payment of the proportionate tax due for the period for which the license is issued, *And provided further*, That if no license taxes are imposed in the Republic of Panama for operating therein the vehicles of the character in this section named, which are duly licensed in the Canal Zone to residents thereof, there shall not be imposed or collected in the Canal Zone any license taxes or charges for operating therein like vehicles when duly licensed in the Republic of Panama to residents thereof.

SECTION II. The license tax on motor vehicles and motor cycles, required by the ordinance of the Isthmian Canal Commission, dated April 9, 1912, approved by the Secretary of War, May 1, 1912, amendatory of the ordinance of the Isthmian Canal Commission, enacted August 25, 1910, approved by the Secretary of War, October 31, 1910, shall be collected for the fiscal year, *Provided, however*, That the licensee may obtain a license for one or more quarters of a year upon payment of the proportionate amount of the license tax to cover the period of the license to be issued to him.

The licenses heretofore issued under said ordinances for motor vehicles and motor cycles shall not be affected by this order, and shall continue to run until the end of the quarter following the expiration of such licenses, and thereafter the owners must obtain licenses for the fiscal year, or fraction thereof, in conformity with this section.

SECTION III. The following special license taxes shall be collected in the Canal Zone:

(*a*) For each dance, for which admission is charged, there shall be collected the sum of $5.00, *Provided, however*, That this tax shall not apply to any dance given for purposes of charity or benevolence, or the celebration of any public occasion authorized by the Governor.

(*b*) For operating a hurdy-gurdy, street piano, or hand organ, striking machine, view machine, fortune-telling device, cane rack, doll rack, or other similar device, of a nongambling nature, maintained in the open or within an enclosure, where no admission is charged, $1.00 per month for each such device.

(*c*) For the retail sale of soda water, other aerated waters, or ice cream from any fountain or booth, or from any cart or vehicle, there shall be charged and collected a tax of $2.00 per month.

(*d*) For maintaining a merry-go-round for hire, $10.00 per month.

(*e*) For musicians, jugglers, acrobats, trick riders, fortune tellers, and persons engaged in similar businesses or professions, performing in the public highway, or from house to house, $1.00 per month for each person.

(*f*) For carrying on the business of a peddler, $2.00 per month: *Provided*, That no license fee shall be required where only articles of food are sold, but the person selling such articles of food may obtain the license upon the condition that he will observe the sanitary regulations of the Canal Zone and obey the orders of the sanitary officials in the conduct of such business, and a failure to do so shall authorize the Executive Secretary to cancel such license.

(*g*) For maintaining a shooting gallery, $5.00 per quarter of the year.

(*h*) For the retail sale of tobacco in any form there shall be charged and collected a tax of $2.00 per month.

SECTION IV. Before any person engages in any business or calling, or operates any of the public vehicles mentioned in this order, he shall obtain a license to do so from the Executive Secretary, or the official acting under his authority, and such license shall not issue until the person applying for the same shall present a receipt from the Collector of the Panama Canal showing that the license tax herein provided for has been duly paid: *Provided*, That peddlers of articles of food shall pay no license fee. The license so issued shall authorize the person to conduct the business or calling, or operate the vehicle named therein in the Canal Zone for the period of time mentioned in such license.

The Executive Secretary may refuse to issue a license for any of the purposes hereinbefore mentioned, if the character of the applicant is such as to warrant the belief that the exercise of the privilege granted by the license will not be conducted in an orderly and lawful manner: *And, provided further*, That any license granted pursuant to the foregoing provisions of this order shall at once become null and void upon conviction of the licensee, in any court of the Canal Zone, of a violation of the law in the exercise of the privilege granted by such license.

Any person who shall engage in any of the occupations above enumerated before obtaining the license provided for in this order shall be guilty of a misdemeanor, and shall be subject to a fine not exceeding $25.00 or imprisonment not exceeding thirty days, or both such fine and imprisonment in the discretion of the court.

SECTION V. That the ordinance enacted by the Isthmian Canal Commission on June 9, 1908, and approved by the Secretary of War June 30, 1908, providing for certain taxes and licenses in the Canal Zone, other than for the sale of intoxicating liquors, and the ordinance of the Isthmian Canal Commission of August 5, 1911, approved by the Secretary of War August 22, 1911, amending Section 7 of the above-mentioned ordinance, as well as the ordinance of the Isthmian Canal Commission of October 15, 1912, approved by the Secretary of War October 26, 1912, further amending said Section 7 of said ordinance of June 9, 1908, are hereby repealed; but licenses heretofore issued under said ordinances shall be effective for the period of time specified in such licenses.

This order shall take effect from and after this date.

WOODROW WILSON.

THE WHITE HOUSE, *13 October, 1914.*

[No. 2062.]

EXECUTIVE ORDER.

Amending Paragraph 49 of the "Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, Including All Waters Under Its Jurisdiction."

By virtue of the authority vested in me under the Panama Canal Act, Paragraph 49 of the "Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, Including All Waters Under Its Jurisdiction," promulgated by Executive Order No. 1990, dated July 9, 1914, is hereby amended to read as follows:

49. No radio tolls, either coast station or forwarding, will be imposed against ships on radiograms transmitted by ships on Canal business. There will be no charge made against the Panama Canal, by Canal Zone land lines or radio stations, for the transmission of radiograms to ships on Canal business.

WOODROW WILSON.

THE WHITE HOUSE, *4 November, 1914.*

[No. 2073.]

[Neutrality—Panama Canal Zone.]

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA.

A PROCLAMATION.

Whereas, the United States is neutral in the present war and whereas the United States exercises sovereignty in the land and waters of the Canal Zone and is authorized by its treaty with Panama of February twenty-six, nineteen hundred and four, to maintain neutrality in the cities of Panama and Colon, and the harbors adjacent to the said cities:

Now, therefore, I, WOODROW WILSON, President of the United States of America, do hereby declare and proclaim the following Rules and Regulations Governing the Use of the Panama Canal by Vessels of Belligerents and the Maintenance of Neutrality by the United States in the Canal Zone, which are in addition to the general "Rules and Regulations for the Operation and Navigation of the Panama Canal and Approaches Thereto, including all Waters under its jurisdiction" put into force by Executive Order of July 9, 1914, and I do bring to the attention of all concerned the Protocol of an Agreement between the United States and the Republic of Panama, signed at Washington, October 10, 1914, which protocol is hereunto annexed.

Rule 1. A vessel of war, for the purposes of these rules, is defined as follows: a public armed vessel, under the command of an officer duly commissioned by the government, whose name appears on the list of officers of the military fleet, and the crew of which are under regular naval discipline, which vessel is qualified by its armament and the character of its personnel to take offensive action against the public or private ships of the enemy.

Rule 2. In order to maintain both the neutrality of the Canal and that of the United States owning and operating it as a government enterprise, the same treatment, except as hereinafter noted, as that given to vessels of war of the belligerents shall be given to every vessel, belligerent or neutral, whether armed or not, that does not fall under the definition of Rule 1, which vessel is employed by a belligerent Power as a transport or fleet auxiliary or in any other way for the direct purpose of prosecuting or aiding hostilities, whether by land or sea; but such treatment shall not be given to a vessel fitted up and used exclusively as a hospital ship.

Rule 3. A vessel of war of a belligerent, or a vessel falling under Rule 2 which is commanded by an officer of the military fleet, shall only be permitted to pass through the Canal after her commanding officer has given written assurance to the Authorities of the Panama Canal that the Rules and Regulations will be faithfully observed.

The authorities of the Panama Canal shall take such steps as may be requisite to insure the observance of the Rules and Regulations by vessels falling under Rule 2 which are not commanded by an officer of the military fleet.

Rule 4. Vessels of war of a belligerent and vessels falling under Rule 2 shall not revictual nor take any stores in the Canal except so far as may be strictly necessary;

and the transit of such vessels through the Canal shall be effected with the least possible delay in accordance with the Canal Regulations in force, and with only such intermission as may result from the necessities of the service.

Prizes shall be in all respects subject to the same Rules as vessels of war of the belligerents.

Rule 5. No vessel of war of a belligerent or vessel falling under Rule 2 shall receive fuel or lubricants while within the territorial waters of the Canal Zone, except on the written authorization of the Canal Authorities, specifying the amount of fuel and lubricants which may be received.

Rule 6. Before issuing any authorization for the receipt of fuel and lubricants by any vessel of war of a belligerent or vessel falling under Rule 2, the Canal Authorities shall obtain a written declaration, duly signed by the officer commanding such vessel, stating the amount of fuel and lubricants already on board.

Rule 7. Supplies will not be furnished by the Government of the United States, either directly or indirectly through the intervention of a corporation, or otherwise, to vessels of war of a belligerent or vessels falling under Rule 2. If furnished by private contractors, or if taken from vessels under the control of a belligerent, fuel and lubricants may be taken on board vessels of war of a belligerent or vessels falling under Rule 2 only upon permission of the Canal Authorities, and then only in such amounts as will enable them, with the fuel and lubricants already on board, to reach the nearest accessible port, not an enemy port, at which they can obtain supplies necessary for the continuation of the voyage. The amounts of fuel and lubricants so received will be deducted from the amounts otherwise allowed in the ports under the jurisdiction of the United States during any time within a period of three months thereafter. Provisions furnished by contractors may be supplied only upon permission of the Canal Authorities, and then only in amount sufficient to bring up their supplies to the peace standard.

Rule 8. No belligerent shall embark or disembark troops, munitions of war, or warlike materials in the Canal, except in case of necessity due to accidental hindrance of the transit. In such cases the Canal Authorities shall be the judge of the necessity, and the transit shall be resumed with all possible dispatch.

Rule 9. Vessels of war of a belligerent and vessels falling under Rule 2 shall not remain in the territorial waters of the Canal Zone under the jurisdiction of the United States longer than twenty-four hours at any one time, except in case of distress; and in such case, shall depart as soon as possible; but a vessel of war of one belligerent shall not depart within twenty-four hours from the departure of a vessel of an opposing belligerent.

The twenty-four hours of this rule shall be construed to be twenty-four hours in addition to the time necessarily occupied in passing through the Canal.

Rule 10. In the exercise of the exclusive right of the United States to provide for the regulation and management of the Canal, and in order to ensure that the Canal shall be kept free and open on terms of entire equality to vessels of commerce and of war, there shall not be, except by special arrangement, at any one time a greater number of vessels of war of any one nation, including those of the allies of a belligerent nation, than three in either terminal port and its adjacent terminal waters, or than three in transit through the Canal; nor shall the total number of such vessels, at any one time, exceed six in all the territorial waters of the Canal Zone under the jurisdiction of the United States.

Rule 11. When vessels of war or vessels falling under Rule 2, belonging to or employed by opposing belligerents, are present simultaneously in the waters of the Canal Zone, a period of not less than twenty-four hours must elapse between the departure of the vessel belonging to or employed by one belligerent and the departure of the vessel belonging to or employed by his adversary.

The order of departure is determined by order of arrival, unless the vessel which arrived first is so circumstanced that an extension of her stay is permissible.

A vessel of war of a belligerent or vessel falling under Rule 2 may not leave the waters of the Canal Zone until twenty-four hours after the departure of a private vessel flying the flag of the adversary.

Rule 12. A vessel of war of a belligerent or vessel falling under Rule 2 which has left the waters of the Canal Zone, whether she has passed through the Canal or not, shall, if she returns within a period of one week after her departure, lose all privileges of precedence in departure from the Canal Zone, or in passage through the Canal, over vessels flying the flag of her adversaries which may enter those waters after her return and before the expiration of one week subsequent to her previous departure. In any such case the time of departure of a vessel which has so returned shall be fixed by the Canal Authorities, who may in so doing consider the wishes of the commander of a public vessel or of the master of a private vessel of the adversary of the returned vessel, which adversary's vessel is then present within the waters of the Canal Zone.

Rule 13. The repair facilities and docks belonging to the United States and administered by the Canal Authorities shall not be used by a vessel of war of a belligerent, or vessels falling under Rule 2, except when necessary in case of actual distress, and then only upon the order of the Canal Authorities, and only to the degree necessary to render the vessel seaworthy. Any work authorized shall be done with the least possible delay.

Rule 14. The radio installation of any vessel of a belligerent Power, public or private, or of any vessel falling under Rule 2, shall be used only in connection with Canal business to the exclusion of all other business while within the waters of the Canal Zone, including the waters of Colon and Panama Harbors.

Rule 15. Air craft of a belligerent Power, public or private, are forbidden to descend or arise within the jurisdiction of the United States at the Canal Zone, or to pass through the air spaces above the lands and waters within said jurisdiction.

Rule 16. For the purpose of these rules the Canal Zone includes the cities of Panama and Colon and the harbors adjacent to the said cities.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington this thirteenth day of November in the year of our Lord one thousand nine hundred and fourteen and of the independence of [SEAL.] the United States the one hundred and thirty-ninth.

Woodrow Wilson.

By the President:
W. J. Bryan,
Secretary of State.

[No. 1287.]

Protocol of an agreement concluded between Honorable Robert Lansing, Acting Secretary of State of the United States, and Don Eusebio A. Morales, Envoy Extraordinary and Minister Plenipotentiary of the Republic of Panama, signed the tenth day of October, 1914.

The undersigned, the Acting Secretary of State of the United States of America and the Envoy Extraordinary and Minister Plenipotentiary of the Republic of Panama, in view of the close association of the interests of their respective Governments on the Isthmus of Panama, and to the end that these interests may be conserved and that, when a state of war exists, the neutral obligations of both Governments as neutrals may be maintained, after having conferred on the subject and being duly empowered by their respective Governments have agreed:

That hospitality extended in the waters of the Republic of Panama to a belligerent vessel of war or a vessel belligerent or neutral, whether armed or not, which is employed by a belligerent power as a transport or fleet auxiliary or in any other way for the direct purpose of prosecuting or aiding hostilities, whether by land or sea, shall serve to deprive such vessel of like hospitality in the Panama Canal Zone for a period of three months, and *vice versa*.

In testimony whereof, the undersigned have signed and sealed the present Protocol in the city of Washington, this tenth day of October, 1914.

Robert Lansing. [L. S.]
Eusebio A. Morales. [L. S.]

Executive Order.

By direction of the President, and by virtue of the authority vested in him under the Panama Canal Act, it is hereby ordered:

1. In any case, prior to October 1, 1915, where it has been impracticable for a vessel to be measured for a Panama Canal tonnage certificate before arrival at the Isthmus, and where to hold such vessel for measurement by the Canal authorities before transit through the Canal would cause undue delay, the Governor of the Panama Canal may, in his discretion, permit such vessel to go through the Canal upon the payment of a sufficient amount to cover tolls on the estimated tonnage of the vessel, with twenty per centum added, such payment to be made, or fully secured, in accordance with the provisions of the Executive Order of April 16, 1914.

2. The tonnage of a vessel desiring to go through the Canal under the circumstances herein indicated shall be estimated by the Governor of the Panama Canal, or by his authority, as closely as practicable and may be based on approximate measurements. The Governor's decision as to the estimated tonnage of a vessel shall be final.

3. A refundment of any excess amount in tolls paid for any vessel under the terms of this Order shall only be made after the vessel has been measured under the rules prescribed for the measurement of vessels for the Panama Canal by the Proclamation of the President dated November 21, 1913. Such vessel should be measured at the first opportunity practicable after going through the Canal, and a certified copy of its Panama Canal tonnage certificate shall be furnished the Governor, who shall have the right to satisfy himself that the certificate conforms to the measurement rules before authorizing refundment of excess tolls, which refundment may then be made in the manner prescribed by Paragraph 7 of the Executive Order of April 16, 1914.

4. The Governor of the Panama Canal may prescribe such additional regulations as may be necessary and proper to carry out the intent of this Order.

LINDLEY M. GARRISON,
Secretary of War.

WAR DEPARTMENT, *November 16, 1914.*

EXECUTIVE ORDER.

Amending Sections 1 and 2 of the Executive Order of April 15, 1913, entitled "An Executive Order to Provide Maritime Quarantine Regulations for the Canal Zone and the Harbors of the Cities of Panama and Colon, Republic of Panama."

By virtue of the authority vested in me I hereby establish the following order for the Canal Zone:

I. That the first paragraph of section 1 of the above-mentioned Executive Order is hereby amended to read as follows:

BILLS OF HEALTH.

"Section 1. Masters of vessels clearing from any foreign port or from any port in the possessions or other dependencies of the United States for a port in the Canal Zone or for the ports of Panama or Colon, Republic of Panama, or for passage through the Panama Canal, must obtain an original bill of health in duplicate from the officer or officers authorized by the quarantine laws and regulations of the United States to sign such certificates for vessels entering the ports of the United States. The following form is prescribed for such bills of health:"

II. That the first paragraph of section 2 of the above-mentioned Executive Order is hereby amended to read as follows:

"Section 2. Vessels clearing from any foreign port or from any port in the possessions or other dependencies of the United States for a port in the Canal Zone or for the ports of Panama or Colon, Republic of Panama, or for passage through the Panama Canal, and entering or calling at intermediate ports, must procure at all said ports a supplemental bill of health in duplicate, from the officer or officers authorized by the quarantine laws and regulations of the United States to sign such certificates for vessels entering the ports of the United States. If a quarantinable disease has appeared on board the vessel after leaving the original port of departure, or other circumstances presumably render the vessel infected, the supplemental bill of health should be withheld until such sanitary measures have been taken as are necessary. The following form is prescribed for supplemental bills of health:"

III. This amendment shall take effect from and after the date upon which the Panama Canal is officially and formally opened for use and operation, by proclamation of the President of the United States.

WOODROW WILSON.

THE WHITE HOUSE, *11 January, 1915.*

[No. 2118.]

EXECUTIVE ORDER.

Conditions of Employment.

By virtue of the authority vested in me it is hereby ordered:

1. Pursuant to the provision contained in paragraph 17 of the Executive order of February 2, 1914, fixing the conditions of employment governing employees of the Panama Canal and the Panama Railroad Company on the Isthmus of Panama, a charge will be made for rent, fuel and electric current on and after March 1, 1915.

RENT.

2. The rental will be based on a percentage of the value of the quarters occupied, the rate percentum to be the same for all quarters, and the value of the quarters to be appraised by the Governor of the Panama Canal. The amount to be collected should be sufficient to defray the cost of maintenance of the quarters and grounds, maintenance and renewal of furniture, collection and disposal of garbage, and for bachelor quarters janitor service. No charge will be made for water.

FUEL.

3. Fuel will be sold to employees at cost delivered at quarters.

ELECTRIC CURRENT.

4. The charge for electric current will be based on the cost of the current delivered to the quarters. When practicable the current used will be measured by meters; otherwise a charge will be made for each lamp or other device installed.

5. Where employees for the good of the service are required to live in certain designated quarters, one-half the rental will be remitted.

6. When an officer of the Army or Navy is detailed for duty with the Panama Canal, and the amount of extra compensation of the position he occupies over and above his official salary as an officer of the Army or Navy is not sufficient to cover his rent, he will not be charged for rent, but will receive no extra compensation.

7. The Governor of the Panama Canal is charged with the duty of issuing such instructions as may be necessary to carry out this order and to fix and change from time to time if necessary the rates and charges herein outlined subject to the general instructions provided.

8. The free use of quarters, free fuel and free electric current are not, under the conditions of employment now governing, a vested or contract right of employees but revocable privileges, which it has been considered advisable to continue until the permanent force was organized. The revocation of these privileges shall not be made the basis for increasing salaries or wages or otherwise increasing compensation.

WOODROW WILSON.

THE WHITE HOUSE, *15 January, 1915.*

[No. 2120.]

EXECUTIVE ORDER.

Amending the Civil Service Rules.

Section 2 of Rule X is hereby revoked and the following promulgated in lieu thereof:

2. No person appointed without competitive examination to a position classified at the time of such appointment, and no person serving in an unclassified position, or in a position named in Schedule A or Schedule B, not appointed by competitive examination or by transfer or promotion from a competitive position, shall be transferred to a competitive position except as hereinafter provided in this rule and in Schedule A.

This amendment is promulgated upon the recommendation of the Civil Service Commission to make a definite prohibition upon the transfer of a person appointed through noncompetitive examination under Schedule B, and to indicate that there are exceptions from the general provisions of the section in other sections of the rules.

Section 12 of Rule X is hereby revoked and the following promulgated in lieu thereof:

12. A citizen of the United States in the service of the Panama Canal on or before January 1, 1915, in an excepted position other than that of clerk paying not more than $75 in gold per month may be transferred without examination to a position in the competitive classified service, provided:

(*a*) This section shall not apply to a person appointed to a competitive position in accordance with the civil service rules, his transfer to be governed by the general provisions of the rules.

(*b*) This section shall not apply to a person appointed without examination to perform the duties of clerk of any grade, bookkeeper, stenographer, typewriter, surgeon, physician, trained nurse, or draftsman.

(*c*) He must have rendered at least two years' service in a position above the grade of mere unskilled laborer in the service of the Panama Canal or of the Panama Railroad by transfer from the Canal.

(*d*) He may be transferred to a position of no higher grade requiring similar qualifications or to a position of a lower grade for which he is qualified.

(*e*) He must be specially recommended by the Governor of the Panama Canal by reason of efficient service and satisfactory conduct.

(*f*) If separated from the service the requisition for transfer must be made within three years from the date of separation, and if he has been separated more than one year evidence of continuing good character and efficiency may be required.

This order is promulgated upon the recommendation of the Secretary of War, the Governor of the Panama Canal, and the Civil Service Commission. It supersedes the Executive order of February 18, 1913, relating to the transfer of artisans from the service of the Panama Canal, which by Executive order of June 15, 1914, was included in section 12 of Rule X.

The effect of this order is to confer eligibility for transfer, subject to proper restrictions, upon employees of the Panama Canal who have rendered two years' satisfactory service in excepted positions and who have not had full opportunity for examination. Employees appointed through competitive examination and artisans only have been eligible for transfer, the force of engineers, foremen, trainmen and other persons not regarded as artisans, not being eligible.

WOODROW WILSON.

THE WHITE HOUSE, *19 January, 1915.*

[No. 2121.]

EXECUTIVE ORDER.

Establishing Regulations Governing the Accounting to the Treasury of the United States for Panama Canal Collections (Section 5 of the Act of August 1, 1914, Public No. 161, p. 79).

By virtue of the authority vested in me, under section 5 of the Act of August 1, 1914, I hereby prescribe the following regulations governing accounting to the Treasury of the United States for moneys received on account of the Panama Canal by the collecting officers:

1. The Collector of the Panama Canal shall render his accounts monthly to the Auditor for the War Department for all moneys received by him, or placed to his official credit from whatever source received, or in whatever manner placed to his official credit, on account of the United States (Panama Canal). These accounts, however, need not include revenues of the Canal Zone Government, money order funds, postal saving bank funds, clubhouse funds, moneys of the Panama Railroad Company, or similar moneys or funds for which the United States can not be held to be a trustee. Said accounts shall be rendered in such detail and be accompanied by such papers, records, and copies thereof relating to such collections as are hereinafter specified and upon forms to be approved by the Comptroller of the Treasury in accordance with these regulations.

2. The Collector shall give bond to the United States, to be filed with the Secretary of the Treasury, in such sum as may be fixed by the Governor of the Panama Canal, conditioned for the faithful performance of his duties of collecting and disbursing all public moneys and honestly accounting without fraud or delay for the same, including moneys of the United States embraced in any special deposit account to be submitted to the Auditor for the War Department.

3. The monthly accounts current of the Collector, under both his regular account and such special deposit account as he may be authorized by law to keep, rendered on forms prescribed by the Comptrollor of the Treasury for that purpose, shall be accompanied by a schedule of the amounts received by him, which accounts shall be so stated as to show the date each amount was received by him directly, or from his deputies, or from other receiving agents; the number of the Collector's receipt issued therefor, the person from whom received, the source from which received, and, in proper columns, the amounts collected for tolls, the amount to be covered into the Treasury as miscellaneous receipts, and the amount to be credited to appropriations, and in case of his special deposit account, a schedule of the amount of refunds or repayments made.

4. The schedule showing the details as provided in section three above, shall be accompanied by signed copies of all formal bills, registered as such in the office of the

Auditor of the Panama Canal, on which collection is made, and, where practicable in the judgment of the Governor of the Panama Canal and it can be done without an increase in the clerical force, signed copies of receipts, where there has been no formal bill, will be transmitted to the Auditor for the War Department, together with such other supporting papers as are deemed necessary by the Governor. In addition to the requirements of this section and sections three, five, six and seven hereof, the examination and inspection provided for in section eight hereof, shall be made, and the report of the persons designated thereunder shall be filed with the accounts of the Collector transmitted to the Auditor for the War Department as a part of the record to support such accounts for the period covered by such report. The facts stated in this report shall be certified to by the persons designated to make the inspection and examination. Such inspection and examination shall be made at as early a date as practicable after the expiration of the period which it is to cover, and the report of the persons designated to make it shall be promptly filed. A signed copy of this report shall be furnished to and filed by the Auditor of the Panama Canal and preserved as a part of the files of his office and one copy shall be furnished to the Comptroller of the Treasury for his files.

5. Immediately following each item of receipt from the deputy collectors or other receiving agents, there shall be scheduled a list of all items collected by them on formal bills, in the same manner as if paid to the Collector direct, and all other collections not covered by formal bills, shall be segregated into items according to the source from which derived, such as hospital service, water rental, etc. Sales slips, memorandum bills for hotel and hospital services, water rentals, rentals for quarters, electric current, corral services, and bills of like character, and other papers relating thereto need not accompany the Collector's account, except in special cases where it would be necessary that they should accompany the account in order to make a complete explanation of the collection.

6. The Auditor of the Panama Canal shall prepare and forward with the Collector's account, a consolidated statement showing the total amount received by the Collector, classified according to the sources from which derived with as much detail as practicable, whether from sales of material, repairs, rentals, hotel or hospital service, towage, pilotage, etc., and shall specify the amount to be credited to each appropriation or to miscellaneous receipts, and the amount that should appear in the special deposit account.

7. The Auditor of the Panama Canal will certify to the correctness of the statement above referred to, and, in addition, will certify that he has examined the records and accounts of all officers and agents who have collected moneys for the Panama Canal, and that the statements include all funds received by the Collector from the persons and sources indicated, and that, so far as shown by the records of the Auditor's office, the Collector's account is a full, true and complete account of all public moneys which came into the possession of the Collector during the period covered by the account, and that the special deposit account of the Collector contains a true, correct, and complete account of all moneys received by the Collector or placed to his official credit in his special deposit account, which does not appear in his regular account.

8. As a part of the detail required by these regulations, two competent persons, one from the office of the Auditor for the War Department designated by the Auditor, and one from the office of the Comptroller of the Treasury designated by the Comptroller, shall be detailed semi-annually at such time as may be designated by the Comptroller, but not oftener than once in six months, to proceed to the Canal Zone and examine the records and accounts of the collections of the Panama Canal for the six months just prior to such examinations, in such detail as may be necessary to enable them to verify the correctness of the collections not supported by collection vouchers in detail for such period, as stated in the schedule of collections submitted by the Collector with his accounts. They shall also make such other investigations as the Comptroller may direct. Such persons shall make a report in triplicate, and certify and file the same as provided in section four hereof. If such persons disagree each shall make and file in the same manner as provided for the joint report in section four hereof a separate report as to the items upon which they disagree. Such persons shall be given free access to all records and papers pertaining to the accounts under examination. Such persons shall be furnished free transportation going to and returning from the Isthmus, including meals while on the steamer, and shall be paid a per diem of four ($4.00) dollars from the day of sailing from the United States until return thereto, both dates inclusive, in lieu of subsistence and all other expenses. Such expenses shall be paid out of any appropriation for the Panama Canal that may be designated by the Governor, and which is applicable therefor.

9. The Collector shall, within twenty days after the close of each month, forward to the Auditor of the Panama Canal for administrative examination, his special deposit

and regular accounts for such month. The Auditor of the Panama Canal shall give such accounts an administrative examination, and transmit them to the the Auditor for the War Department within twenty days from the date of their receipt from the Collector.

10. The gross proceeds of all collections which the Panama Canal Act and section three of the Act of August 1, 1914, or any other Act, authorize to be credited to appropriations, shall be so credited by the Collector and deposited in the Treasury to the credit of the proper appropriation or transferred to the Paymaster of the Panama Canal to be taken up in the Paymaster's accounts for disbursement.

11. At the close of each fiscal year the Auditor of the Panama Canal shall determine, as nearly as may be practicable from a profit and loss account to be stated by him, the net profits for such fiscal year, and direct that there shall be covered into the Treasury from the proper appropriation to "Miscellaneous Receipts," a sum equal to the net profits shown by such account, and said account shall be transmitted to the Auditor for the War Department for examination and file.

12. The facts necessary to support such transactions as are not shown by collection vouchers in detail, shall be verified by the certificate of an administrative officer having personal knowledge of such transaction where this is practicable. The certificate above required may be so made, however, that one certificate will cover a number of items of collections of the same class, involving different transactions, such as the collections from the Tivoli Hotel, or the sales in stores, etc., as shown in section five hereof, covering a period of time to be stated in such certificate.

13. The Governor of the Panama Canal shall prescribe such administrative regulations as he deems necessary to efficiently carry these regulations into full force and effect.

WOODROW WILSON.

THE WHITE HOUSE, *4 February, 1915.*

[No. 2135.]

EXECUTIVE ORDER.

Relative to the production, importation, compounding, dealing in, dispensing, selling, distributing, or giving away Opium or Coca Leaves, their salts, derivatives, or preparations, in the Canal Zone, under the Act of Congress approved December 17, 1914.

Whereas the Act of Congress approved December 17, 1914 (Public No. 223), is made specifically applicable in the Canal Zone, but further provides that

"The President is authorized and directed to issue such executive orders as will carry into effect in the Canal Zone the intent and purpose of this Act by providing for the registration and imposition of a special tax upon all persons in the Canal Zone who produce, import, compound, deal in, dispense, sell, distribute, or give away opium or coca leaves, their salts, derivatives, or preparations;" and

Whereas the Auditor of the Panama Canal and the Collector of the Panama Canal perform in the Canal Zone corresponding duties in connection with the revenues of the Canal Zone as are performed in the United States by the Commissioner of Internal Revenue and the collectors of internal revenue, respectively;

Now therefore, by virtue of the authority conferred upon me by the above quoted provisions of the said Act of Congress, it is hereby ordered:

SECTION 1. That in enforcing the provisions of the Act of Congress approved December 17, 1914, entitled "An Act to provide for the registration of, with collectors of internal revenue, and to impose a special tax upon all persons who produce, import, manufacture, compound, deal in, dispense, sell, distribute, or give away opium or coca leaves, their salts, derivatives, or preparations, and for other purposes," the Auditor of the Panama Canal shall perform in the Canal Zone administrative duties like unto those the Commissioner of Internal Revenue is required to perform outside of the Canal Zone, and the Collector of the Panama Canal shall perform duties in the Canal Zone like unto those the collectors of internal revenue are required to perform in districts outside of the Canal Zone.

SECTION 2. That on and after the first day of March, 1915, no person shall produce, import, manufacture, compound, deal in, dispense, sell, distribute, or give away in the Canal Zone opium or coca leaves, their salts, derivatives, or preparations, unless he shall have complied with the provisions of the Act of Congress approved December 17, 1914, in the manner provided for in this Executive Order.

SECTION 3. That every person who by the terms of said Act would be required, if located outside of Porto Rico, the Philippine Islands, or the Canal Zone, to register with the collector of internal revenue of his district, his name or style, place of business, and place or places where such business is to be carried on, shall register the like information with the Collector of the Panama Canal on forms to be prescribed by the Auditor of the Panama Canal. At the time of such registry and on or before the first day of July annually thereafter, every person who produces, imports, manufactures, compounds, deals in, dispenses, sells, distributes, or gives away any of the aforesaid drugs shall pay to the Collector of the Panama Canal a special tax at the rate of One Dollar per annum: *Provided, however,* That any person who would not be required, if located outside of the Canal Zone, to register or pay a special tax shall not be required to register or pay the special tax as herein provided.

Section 4. That the Auditor of the Panama Canal, with the approval of the Governor of the Panama Canal, shall cause suitable order forms and blanks to be prepared and placed in the hands of the Collector of the Panama Canal for sale by such Collector to persons who shall have registered and paid the special tax as required by said Act and this Executive Order. The price to be paid for such order forms and blanks shall be One Dollar per hundred, and the Collector of the Panama Canal shall be subject to the same limitation as to sales of said order forms and blanks as collectors of internal revenue in districts outside of the Canal Zone. The Collector shall account monthly to the Auditor of the Panama Canal for the special taxes collected by him and for all monies received by him from the sale of blanks, or for any other purpose under the provisions of said Act. The Auditor of the Panama Canal, with the approval of the Governor of the Panama Canal, shall provide such regulations as may be necessary to carry into full force and effect the provisions of this Executive Order. In providing such regulations the form of regulations prescribed by the Internal Revenue Commissioner and approved by the Secretary of the Treasury shall be followed so far as they can be made applicable to conditions in the Canal Zone.

Section 5. That the Auditor of the Panama Canal, with the approval of the Governor of the Panama Canal, shall have the right to make such inspection and take such action as may be necessary to enforce the provisions of the Act of December 17, 1914, under this Executive Order.

Section 6. That any person who violates or fails to comply with any of the requirements of said Act in the manner provided for in this Executive Order, in the Canal Zone, shall be subject to such penalties as are provided for in said Act.

WOODROW WILSON.

THE WHITE HOUSE, *1 March, 1915.*

[No. 2142.]

EXECUTIVE ORDER.

The year limit upon eligibility for reinstatement is hereby waived to permit the reinstatement of Dr. Edward P. Beverley as a physician in the Panama Canal service.

Dr. Beverley's reinstatement by Executive Order is recommended by General Geo. W. Goethals, Governor of the Panama Canal. Dr. Beverley entered the service on July 6, 1904; served through the period when tropical diseases were prevalent, and by his efficient service was successively promoted until he held one of the highest positions therein at the close of his service December 15, 1913, being rated as "excellent" in both conduct and character of work. Necessity for a change of climate required his resignation, but he has recovered from the effects of his long residence in the tropics and desires to return to work on the Isthmus.

The Civil Service Commission concurs in recommending this order.

WOODROW WILSON.

THE WHITE HOUSE, *23 March, 1915.*

[No. 2152.]

EXECUTIVE ORDER.

In pursuance of the authority conferred upon the President of the United States by the Act approved March 4, 1915, entitled, "An Act To provide for provisional certificates of registry of vessels abroad, and for other purposes," the Collector of Customs of the Philippine Islands, the Captains of the Ports of Cristobal and Balboa, Canal Zone, and the Governor of Guam, are designated for the purpose of issuing provisional certificates of registry to vessels abroad which have been purchased by citizens of the United States, including corporations, as defined in section forty-one hundred and thirty-two, Revised Statutes, as amended by the Panaman Canal Act and the Act of August eighteenth, nineteen hundred and fourteen.

WOODROW WILSON.

THE WHITE HOUSE, *7 April, 1915.*

[No. 2164.]

EXECUTIVE ORDER.

It is hereby ordered that the portion of the Panama Canal through the continental divide heretofore known as "Culebra Cut" shall hereafter be named "Gaillard Cut" in honor of the late Lieutenant Colonel D. D. Gaillard, Corps of Engineers, United States Army.

As a member of the Isthmian Canal Commission from March 16, 1907, to December 5, 1913, Lieutenant Colonel Gaillard was in charge of the work in Culebra Cut until its virtual completion, being compelled to abandon his duties in July, 1913, through an illness which culminated in his death on December 5, 1913. His period of Panama Canal service included the years of most active construction work. He brought to the service trained ability of the highest class, untiring zeal and unswerving devotion to duty.

I deem it a fitting recognition of Lieutenant Colonel Gaillard's service to the country to rename in his honor the scene of his life's triumph.

WOODROW WILSON.

THE WHITE HOUSE, *27 April, 1915.*

[No. 2185.]

EXECUTIVE ORDER.

The Sundry Civil Act approved March 3, 1915, contains the following clause: "expenses incurred in assembling, sorting, storing, repairing, and selling material, machinery, and equipment heretofore or hereafter purchased or acquired for the construction of the Panama Canal, which are unserviceable or no longer needed, to be reimbursed from the proceeds of such sales."

There is no clause in this Act as there was in former similar acts specifying the manner in which the above-mentioned items might be sold.

Under the general authority of the President to issue regulations for the government of the Panama Canal and by his direction, it is therefore ordered that the regulations relative to the sale of material enumerated above as heretofore laid down by the President for the fiscal year ending June 30, 1915, shall remain in force until further ordered.

LINDLEY M. GARRISON,
Secretary of War.

WAR DEPARTMENT, *Washington, D. C., May 12, 1915.*

EXECUTIVE ORDER.

By virtue of the authority vested in me, it is hereby ordered that the Executive Order of January 15, 1915, relative to charges for rent, fuel and electric current furnished employees of the Panama Canal and the Panama Railroad Company on the Isthmus of Panama, is modified by suspending from the operation thereof so much as relates to rent, fuel, and lights during the period of actual construction of the Panama Canal but not later than June 30, 1916.

WOODROW WILSON.

THE WHITE HOUSE, *25 May, 1915.*

[No. 2204.]

EXECUTIVE ORDER.

It is hereby ordered that the Governor of the Panama Canal shall have a distinctive flag for use in his official capacity, which shall be known as the Flag of the Governor of the Panama Canal.

This flag shall be made in two dimensions, as follows: large flag, 6 ft. hoist, by 7 ft. 6 in. fly; small flag, 2 ft. hoist, by 2 ft. 6 in. fly. The body of the flag shall be dark blue. In the center of the flag shall be a white circle, the diameter of which shall be approximately one-half of the fly length of the flag. In the center of the circle, on each side of the flag, shall be the Seal of the Canal Zone, of which the following is a description:

"The seal consists of a shield, showing in base a Spanish galleon of the Fifteenth Century under full sail coming head on between two high banks, all purpure, the sky yellow with the glow of sunset; in the chief are the colors of the arms of the United States. Under the shield is the motto: 'The land divided; the world united!'"

The Flag of the Governor of the Panama Canal shall be used as follows:

When the Governor of the Panama Canal is embarked in a boat for the purpose of making an official call, his flag shall be carried on a staff at the bow of the boat in which he is embarked.

While on board in his official capacity, or when taking passage on any Canal craft, his flag shall be carried at the mainmast head.

WOODROW WILSON.

THE WHITE HOUSE, *8 June, 1915.*

[No. 2208.]

APPENDIX P.

CHARTS SHOWING ORGANIZATION OF THE PANAMA CANAL AND PANAMA RAILROAD COMPANY, JULY 1, 1915.

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